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Teeter

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(54) **DISPOSABLE AND TAMPER-RESISTANT RFID LOCK**

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This patent is subject to a terminal disclaimer.

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(63) Continuation of application No. 14/185,671, filed on Feb. 20, 2014, now Pat. No. 9,076,312, which is a continuation-in-part of application No. 13/625,230, filed on Sep. 24, 2012, now Pat. No. 8,710,991, and a continuation-in-part of application No. 12/819,902, filed on Jun. 21, 2010, now Pat. No. 8,274,389, and a continuation of application No. 11/960,128, filed on Dec. 19, 2007, now Pat. No. 7,800,504.

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(51) **Int. Cl.**

G08B 13/14	(2006.01)
G08B 13/24	(2006.01)
G06K 19/077	(2006.01)
G09F 3/03	(2006.01)
G06K 1/00	(2006.01)
E05B 1/00	(2006.01)

(52) **U.S. Cl.**

CPC ***G08B 13/2431*** (2013.01); ***G06K 19/07798*** (2013.01); ***G08B 13/2434*** (2013.01); ***G09F 3/0317*** (2013.01); ***G09F 3/0335*** (2013.01); *E05B 1/00* (2013.01); *G06K 1/00* (2013.01); *Y10T 29/49826* (2015.01)

(58) **Field of Classification Search**

CPC E05B 1/00; G06K 19/07749; G06K 1/00

See application file for complete search history.

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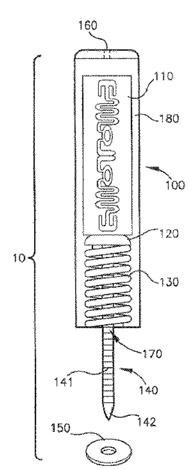
(57) **ABSTRACT**

Implementations described and claimed herein provide an RFID locking apparatus including an RFID tag, a locking member, and a disabling member. The RFID tag is disposed inside a housing and has a chip and an antenna that emits a signal. The locking member includes a tube that extends outwardly from within the housing and a cable connected to the disabling member and exiting the housing via the tube. The locking member configured to compress a spring into a loaded state by pulling the cable. The disabling member is disposed near the spring inside the housing and is configured to destroy the antenna and/or the chip, such that the signal cannot be emitted, upon release of the spring from the loaded state. The RFID locking apparatus is configured to release the spring when the locking member is damaged.

7 Claims, 17 Drawing Sheets



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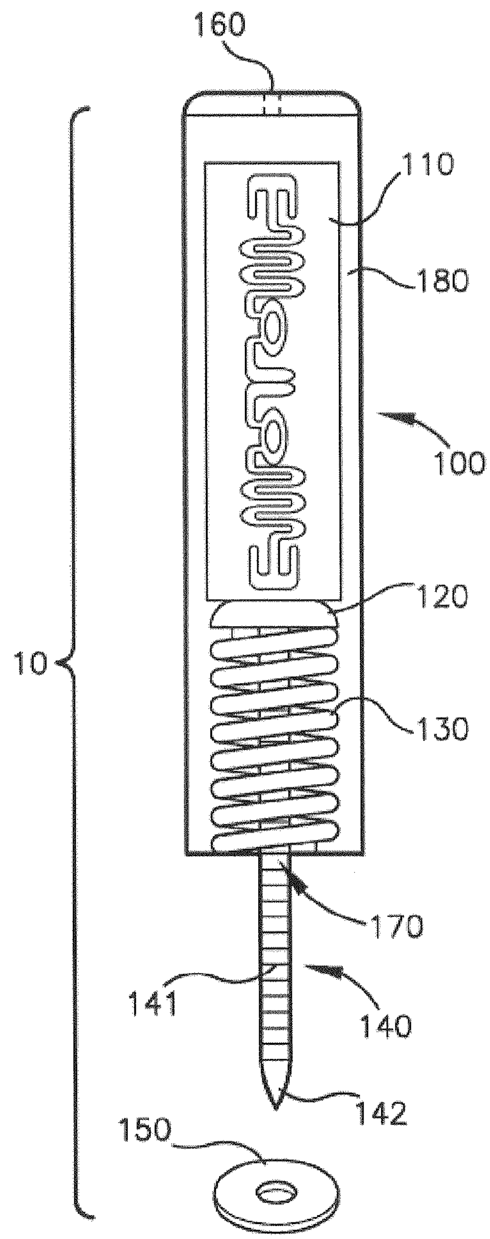
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FIG. 1

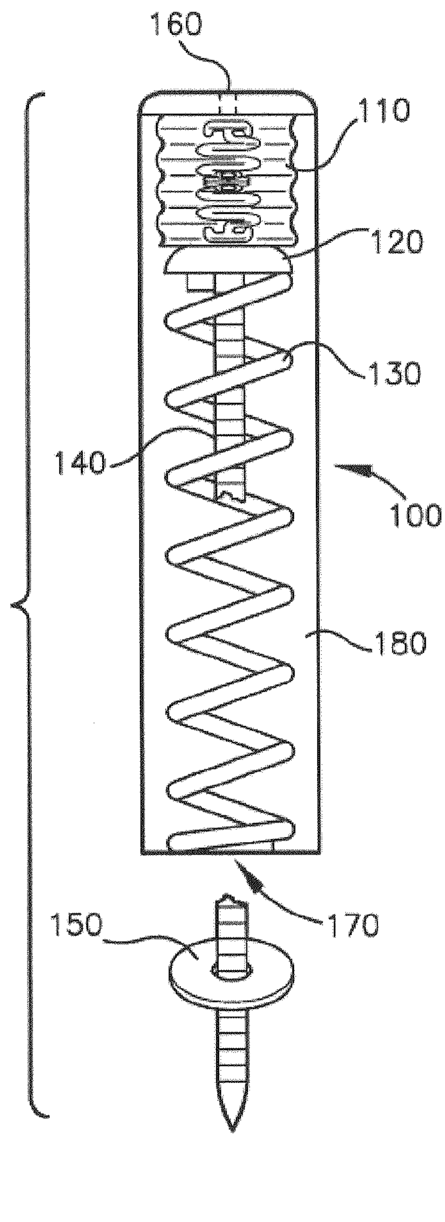
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FIG. 1A

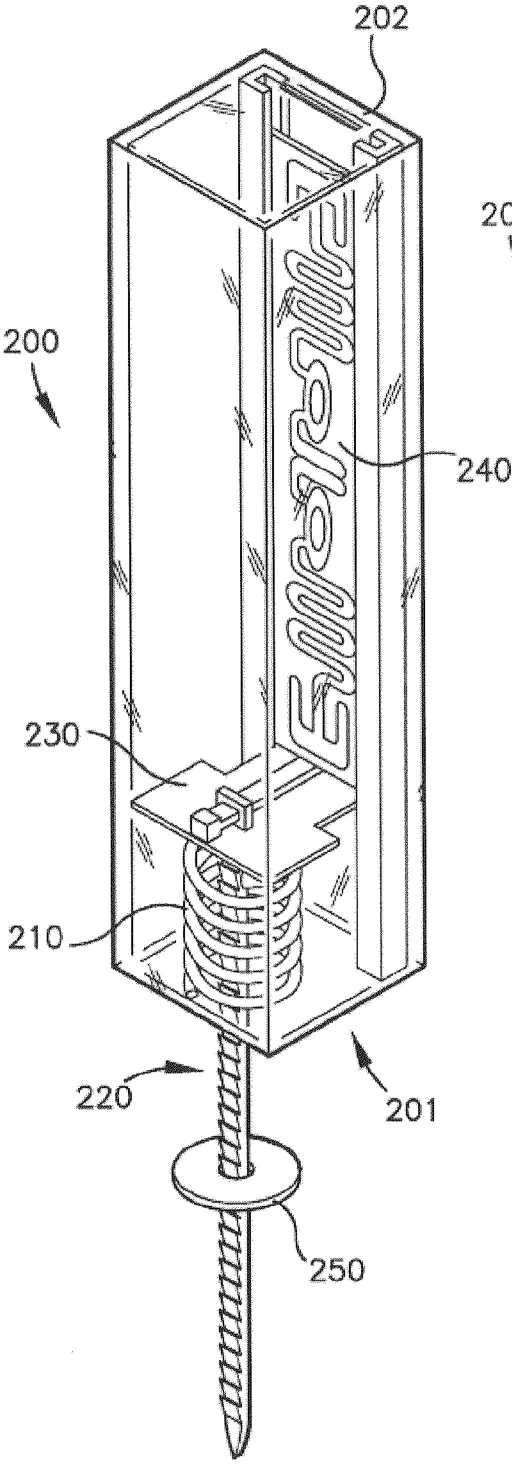
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FIG. 2

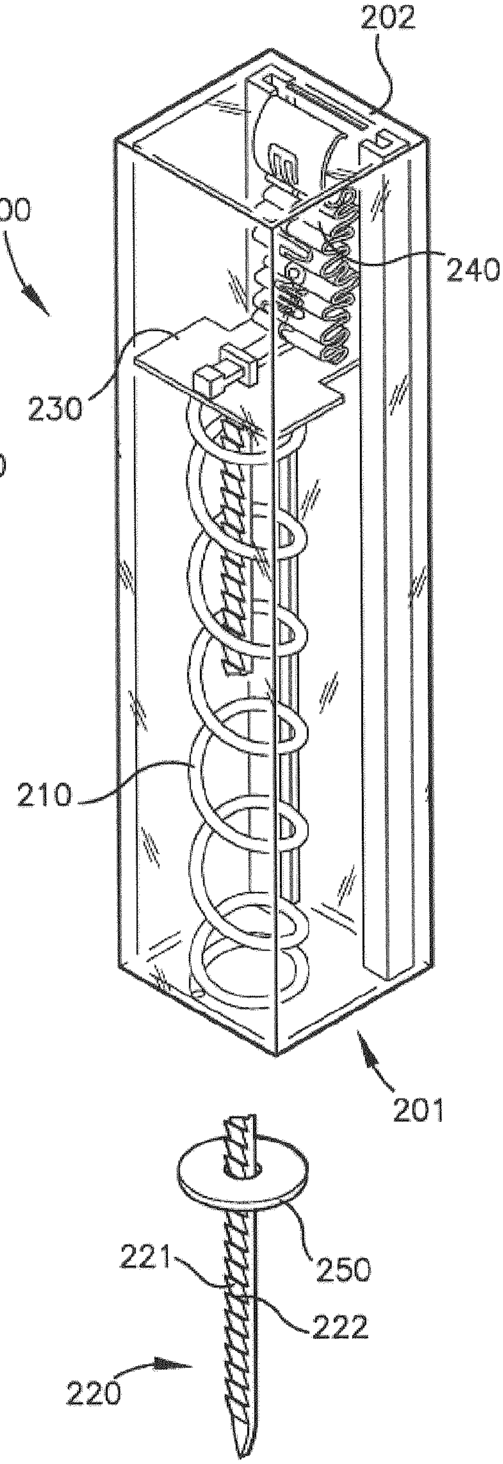
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FIG. 2A

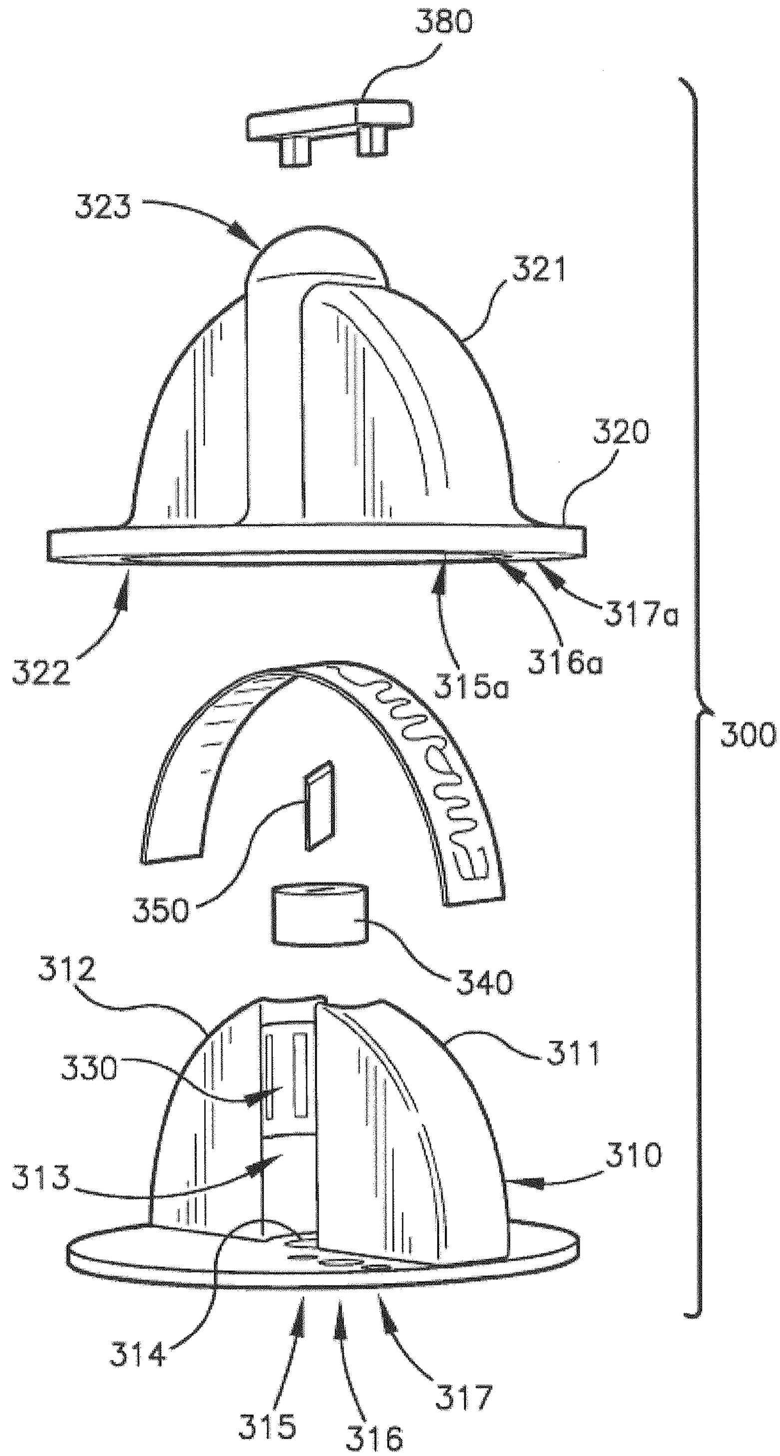
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FIG. 3

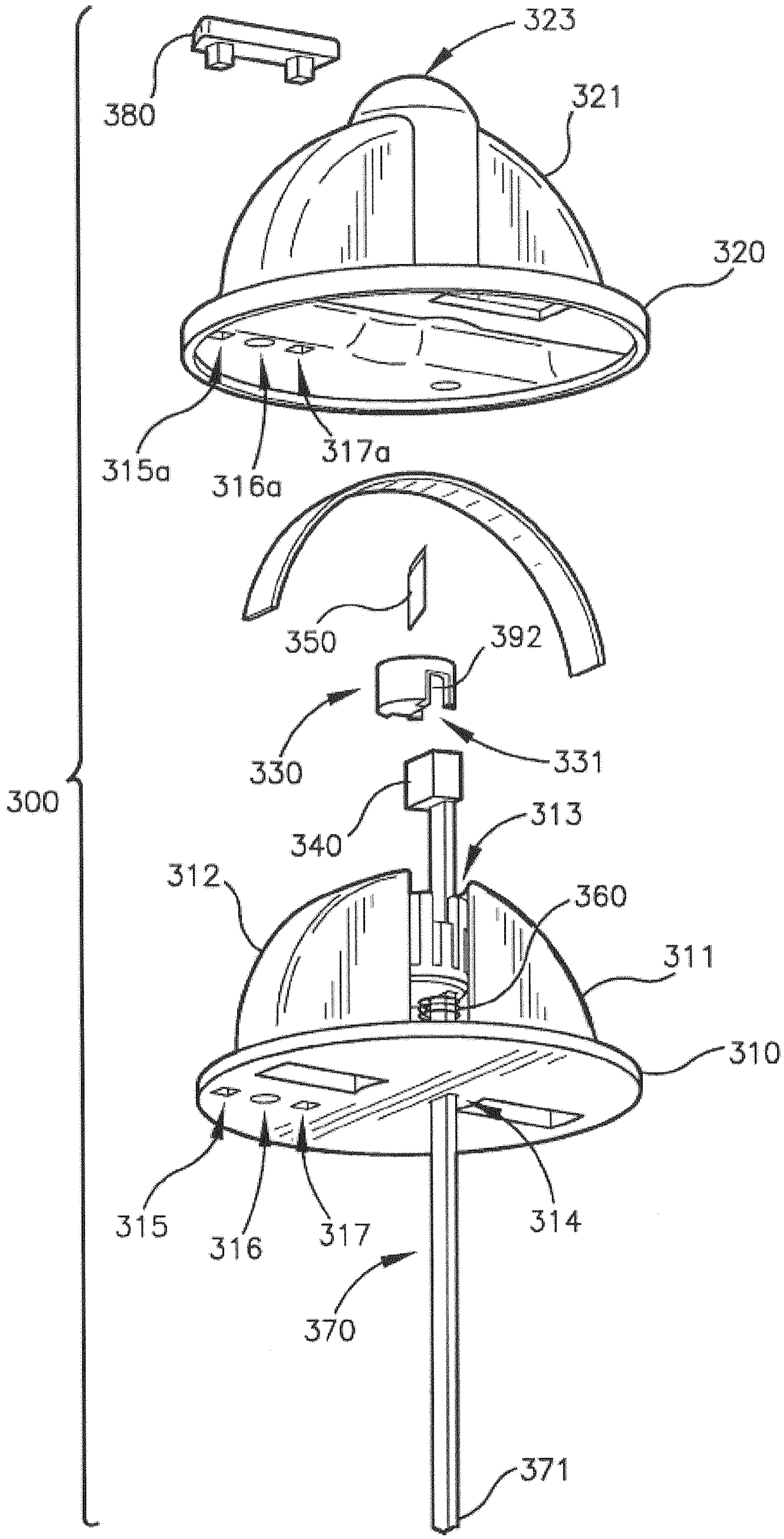
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FIG. 3A

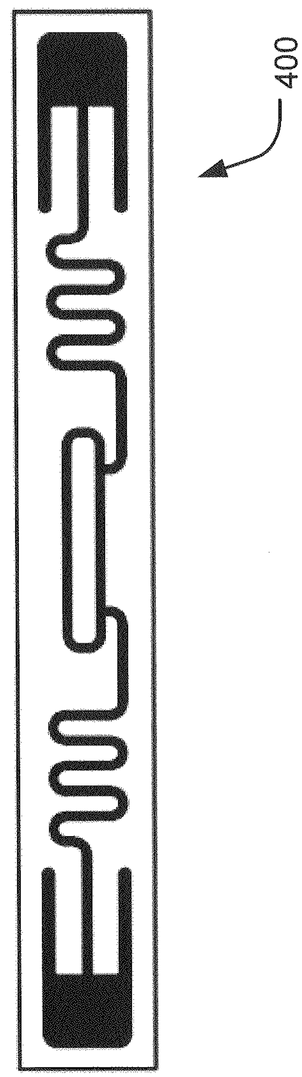

FIG. 4

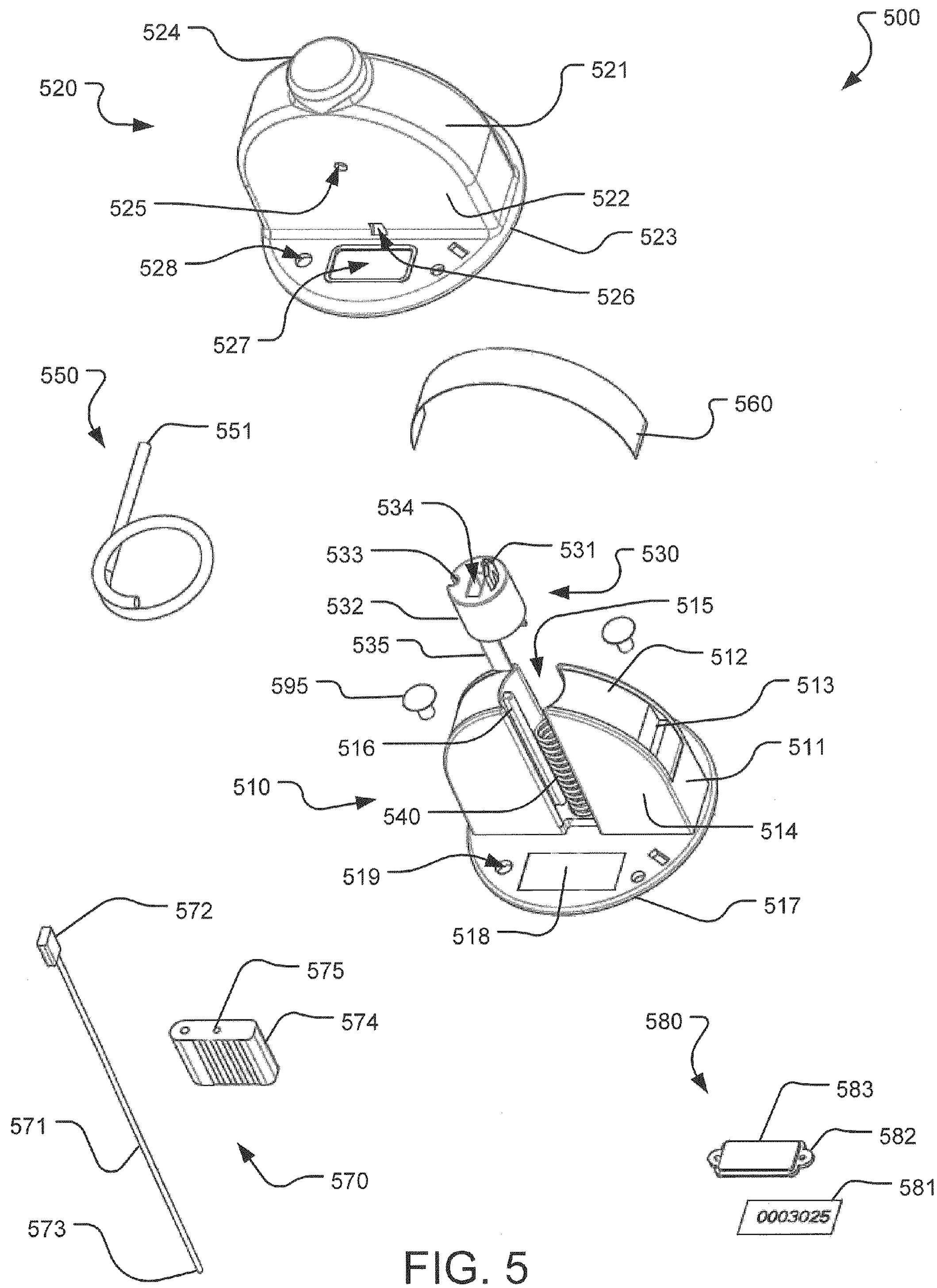
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FIG. 5

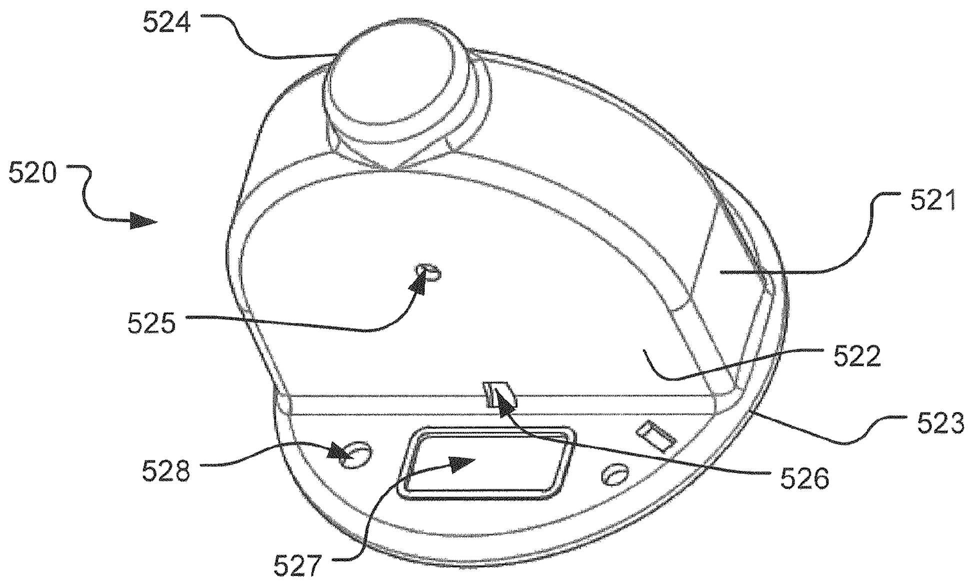
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FIG. 6A

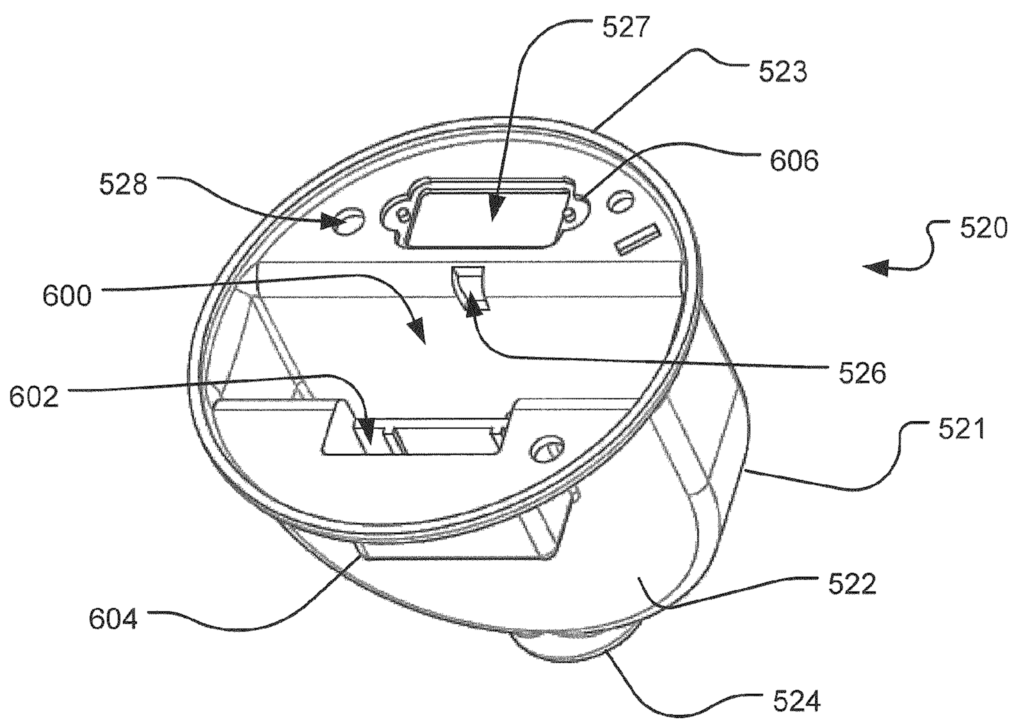
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FIG. 6B

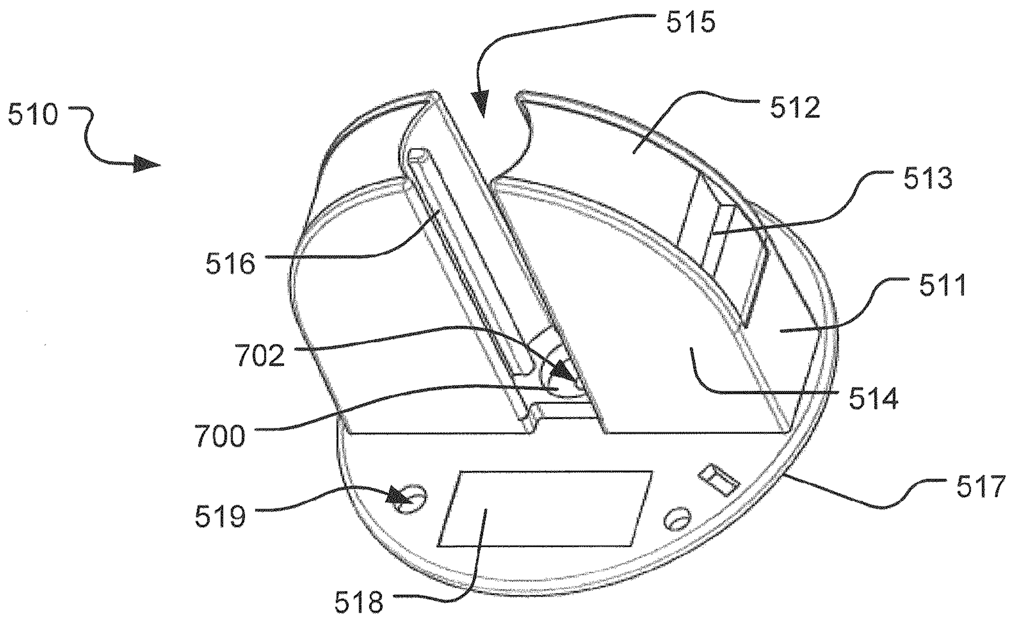
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FIG. 7A

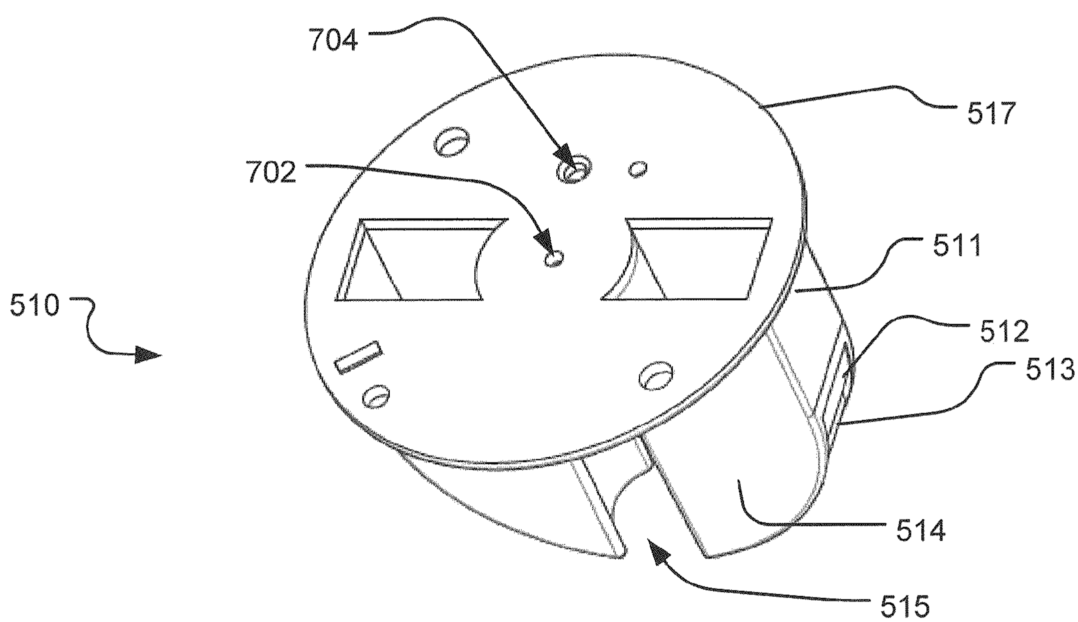
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FIG. 7B

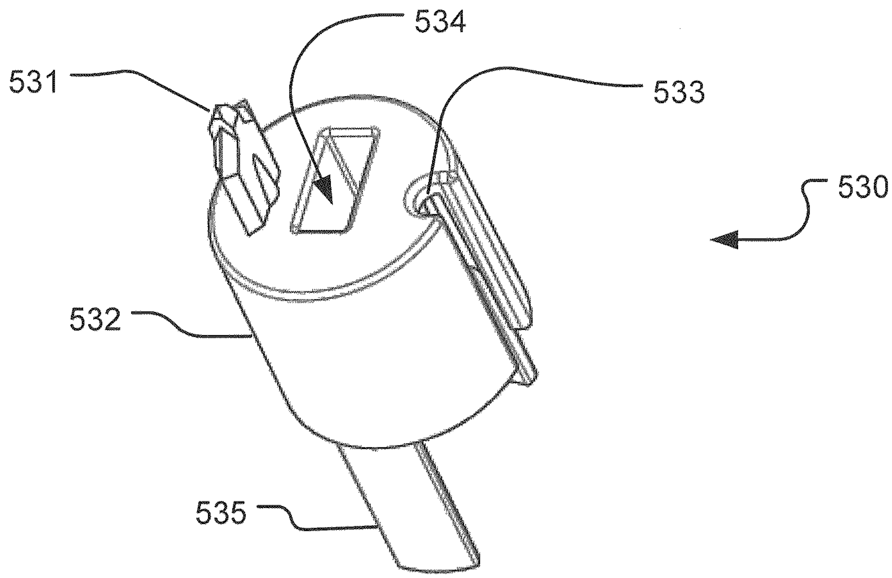

FIG. 8A

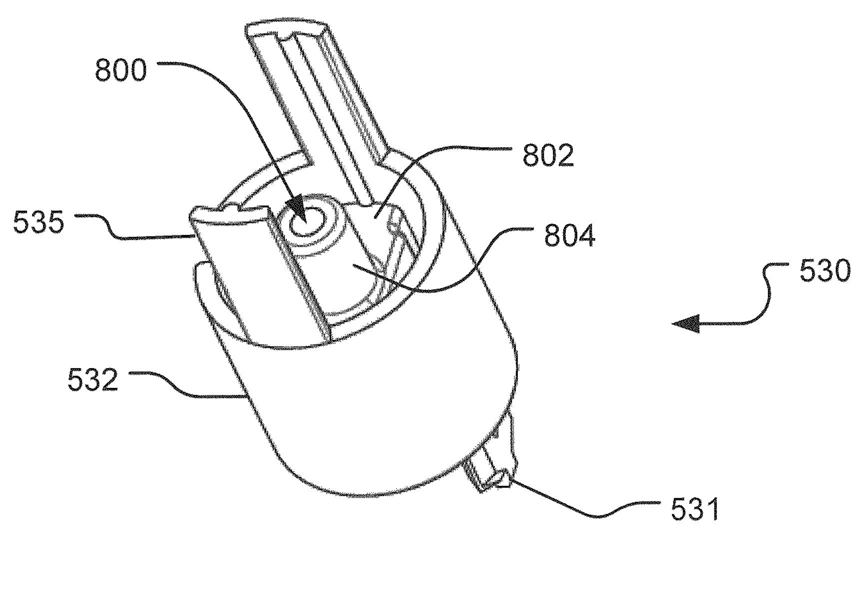

FIG. 8B

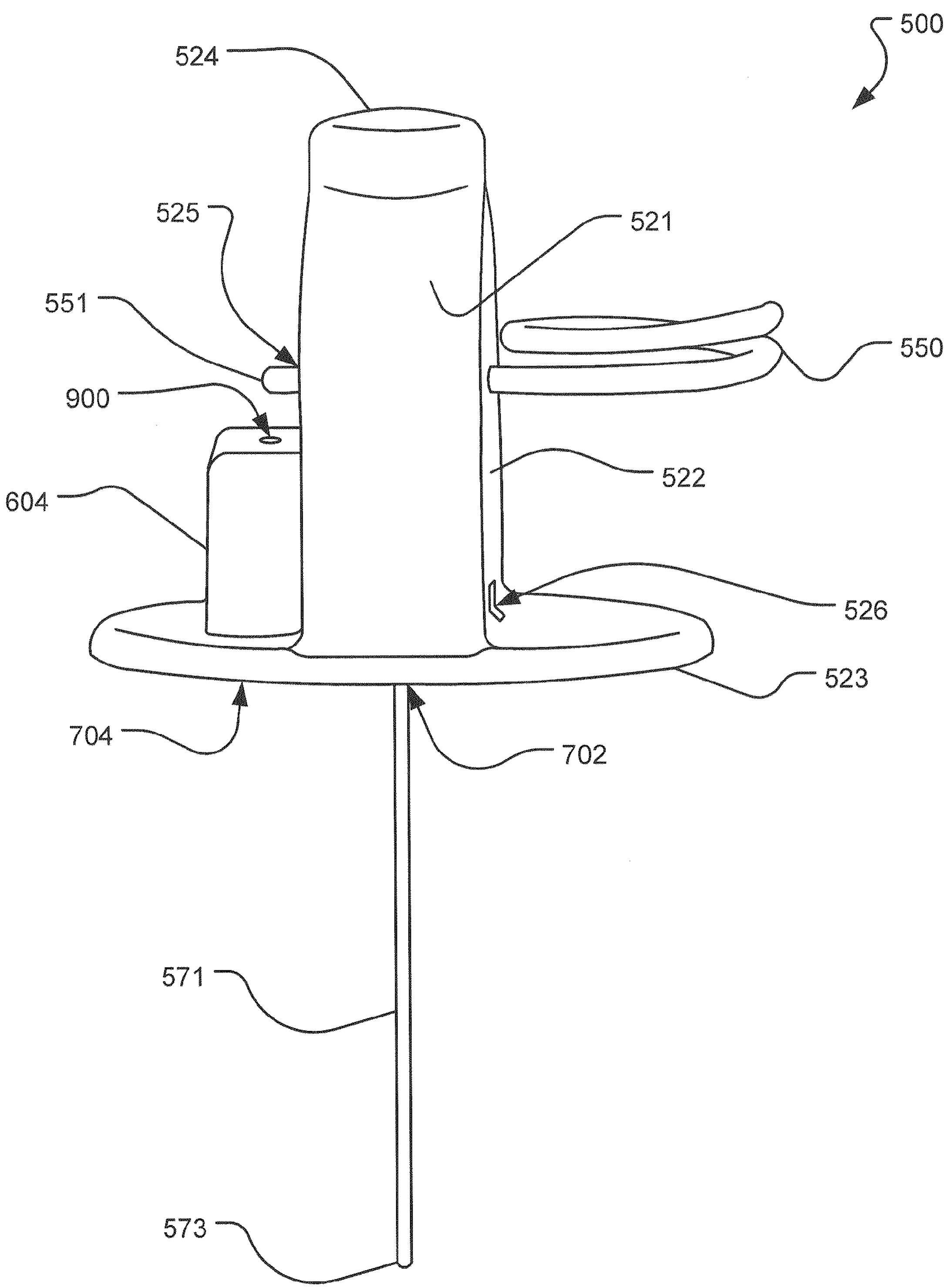

FIG. 9

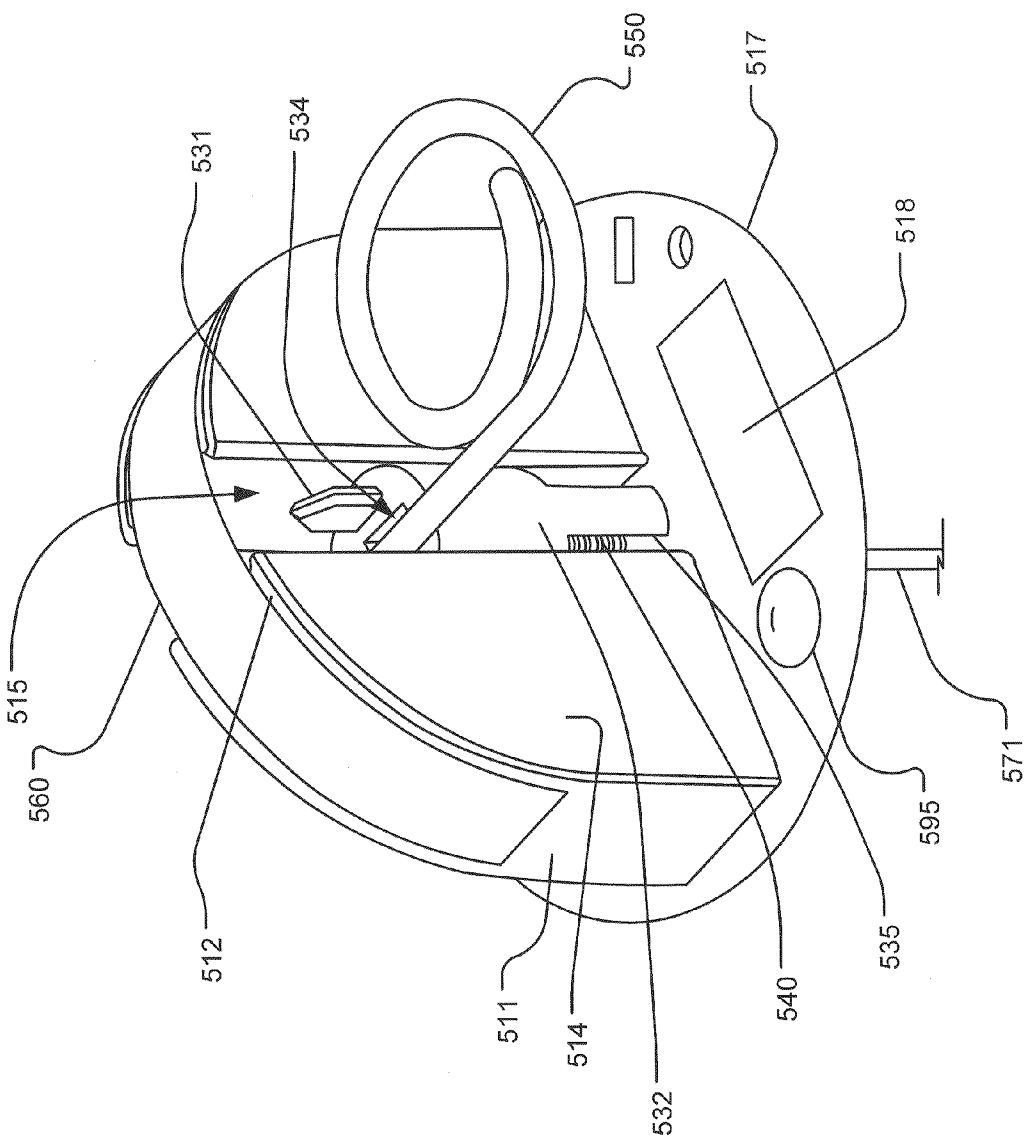

FIG. 10

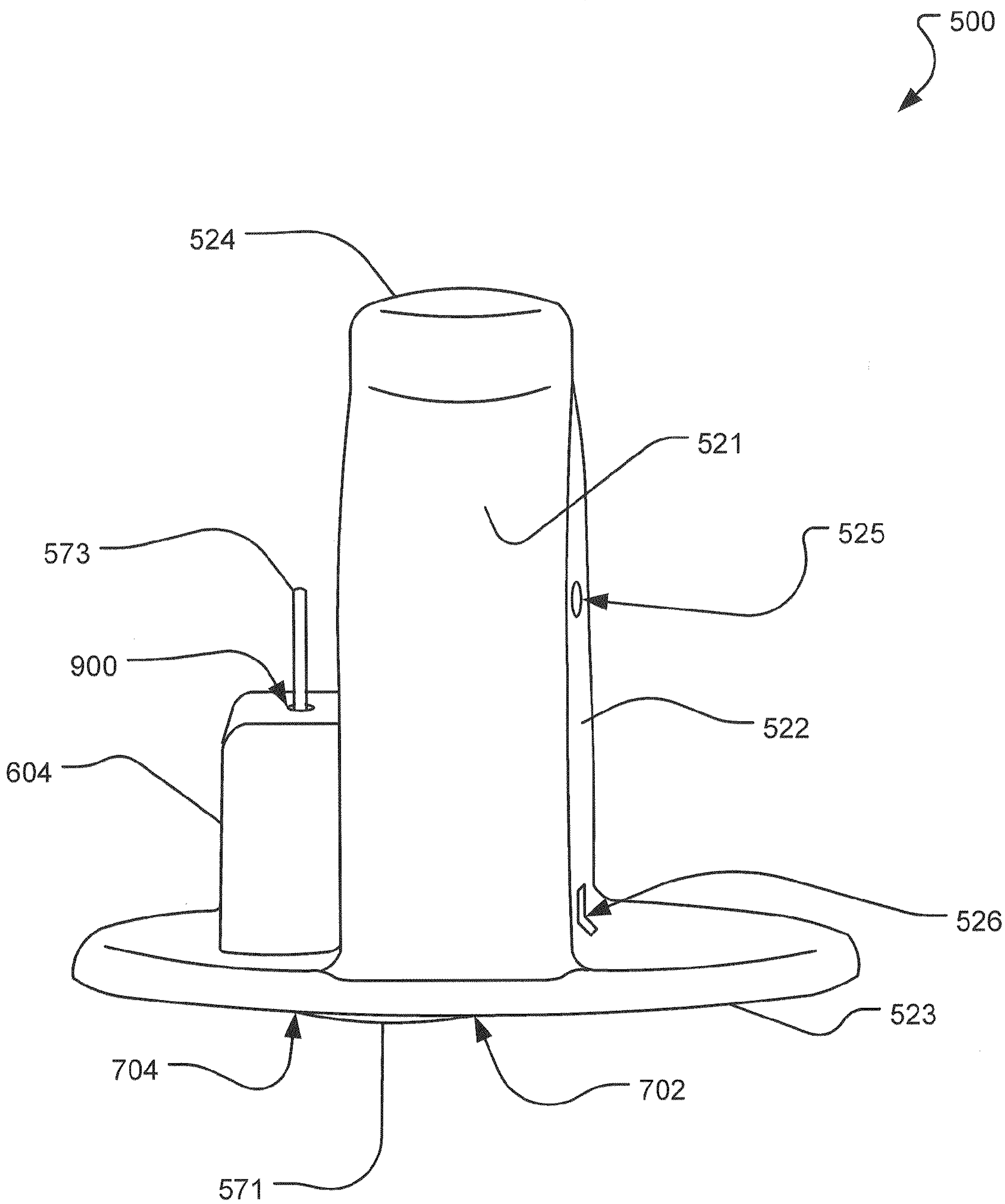

FIG. 11

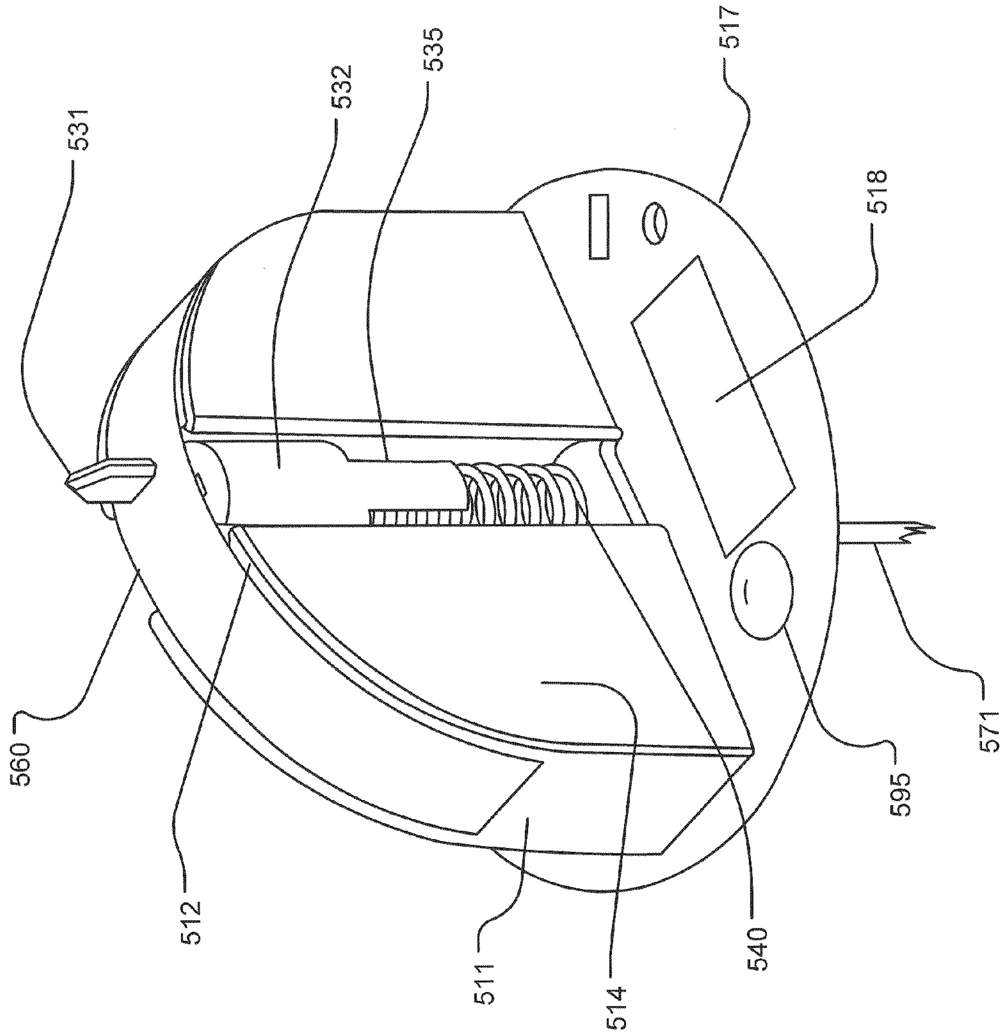

FIG. 12

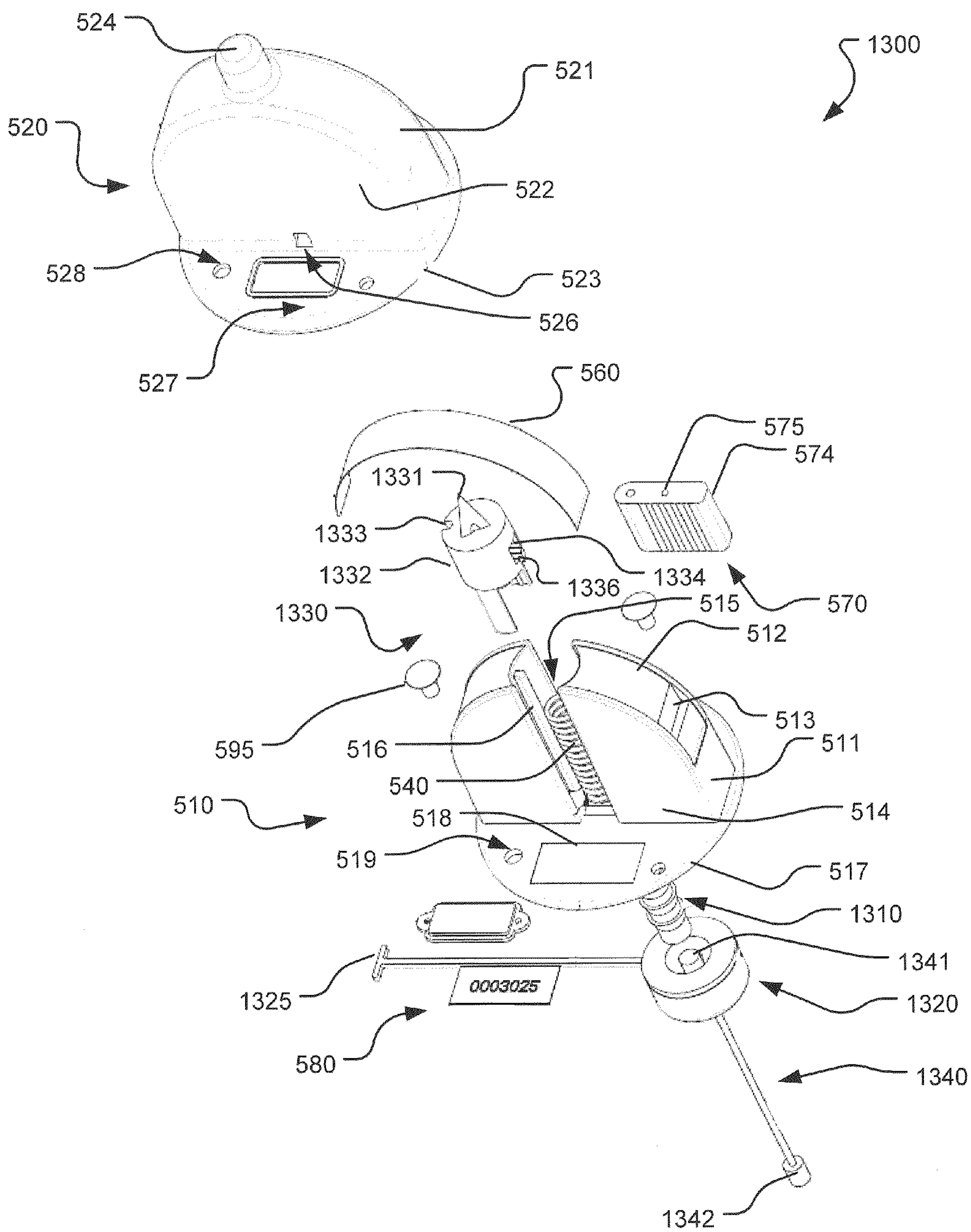
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FIG. 13

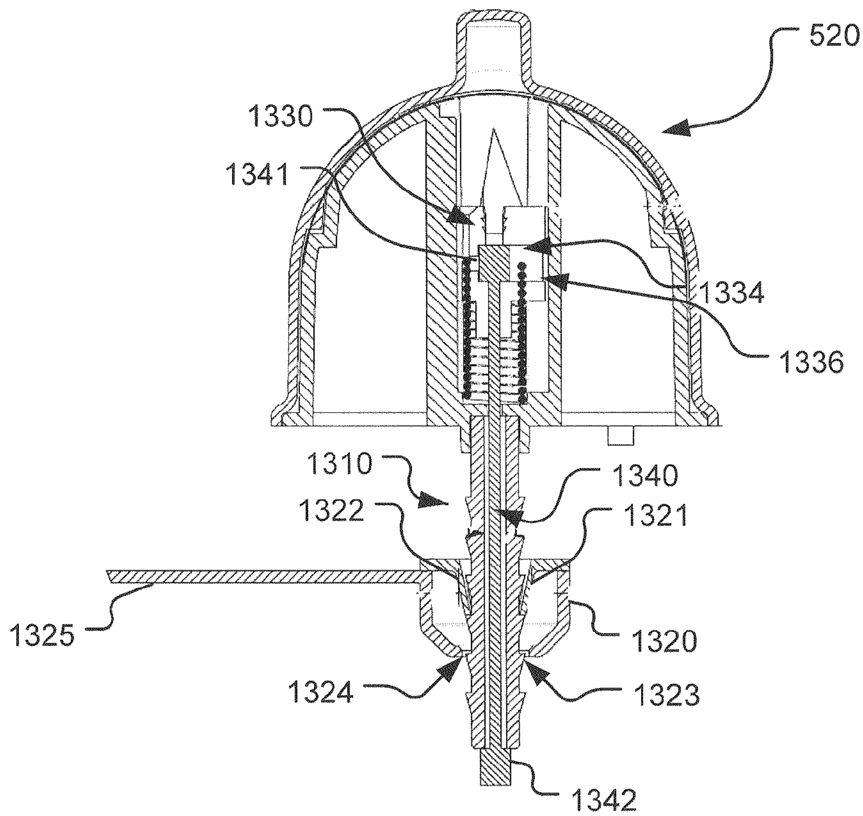
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FIG. 14

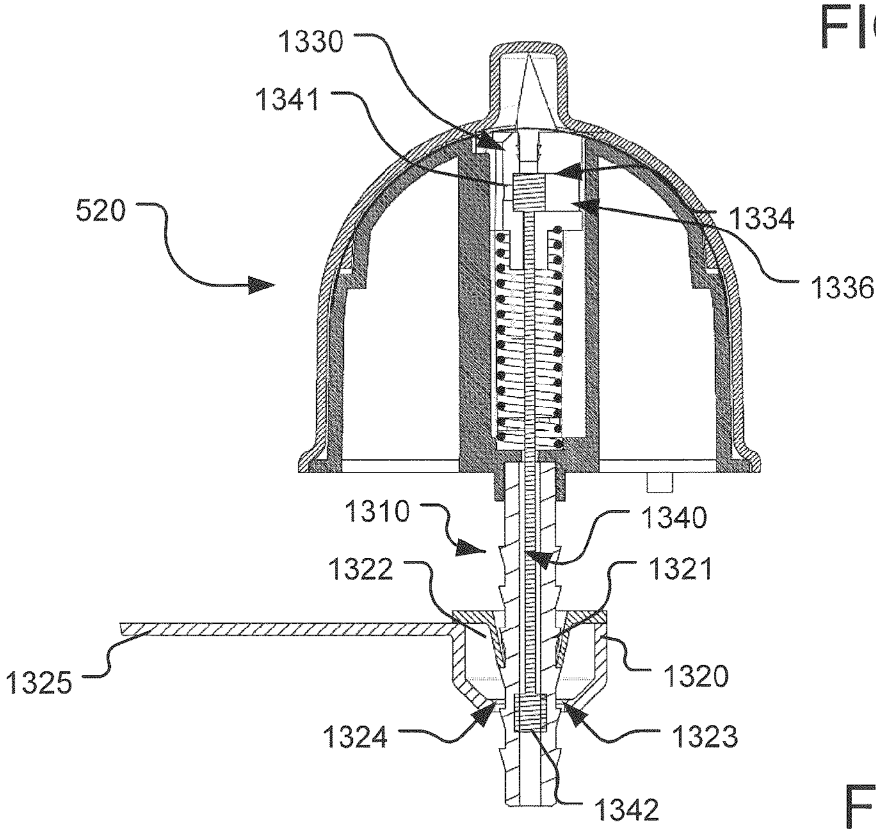
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FIG. 15

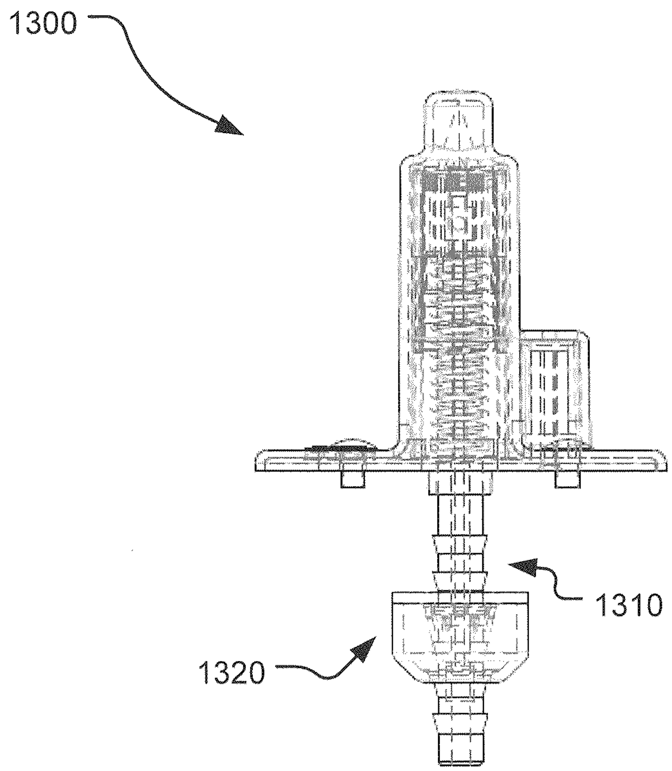
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FIG. 16

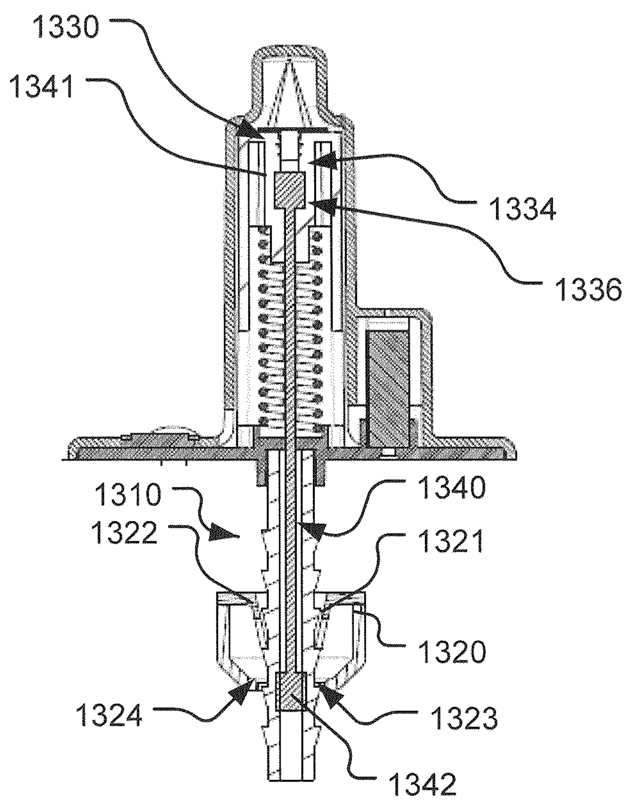
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FIG. 17

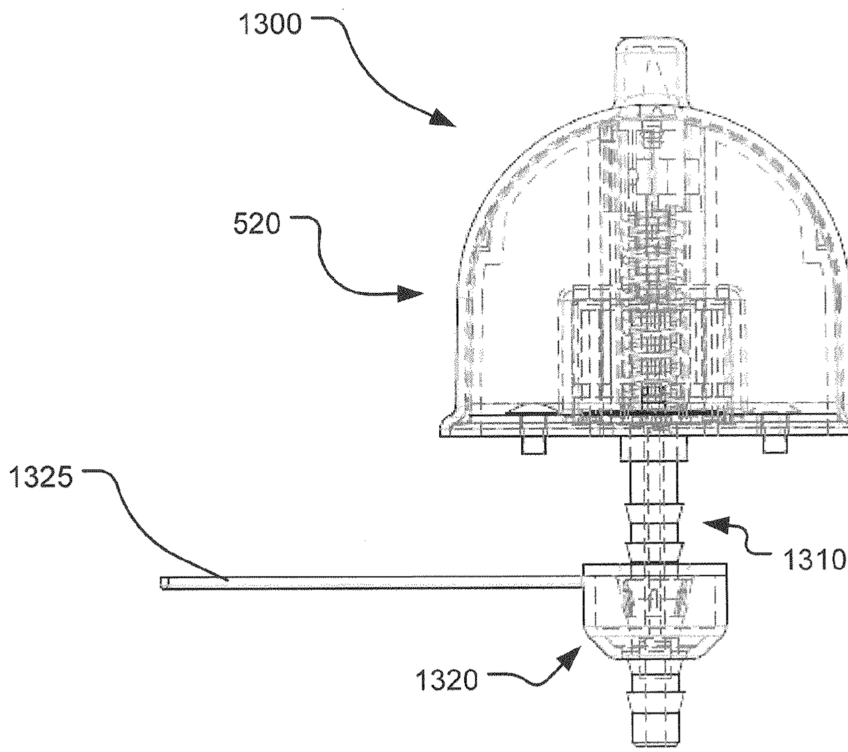

FIG. 18

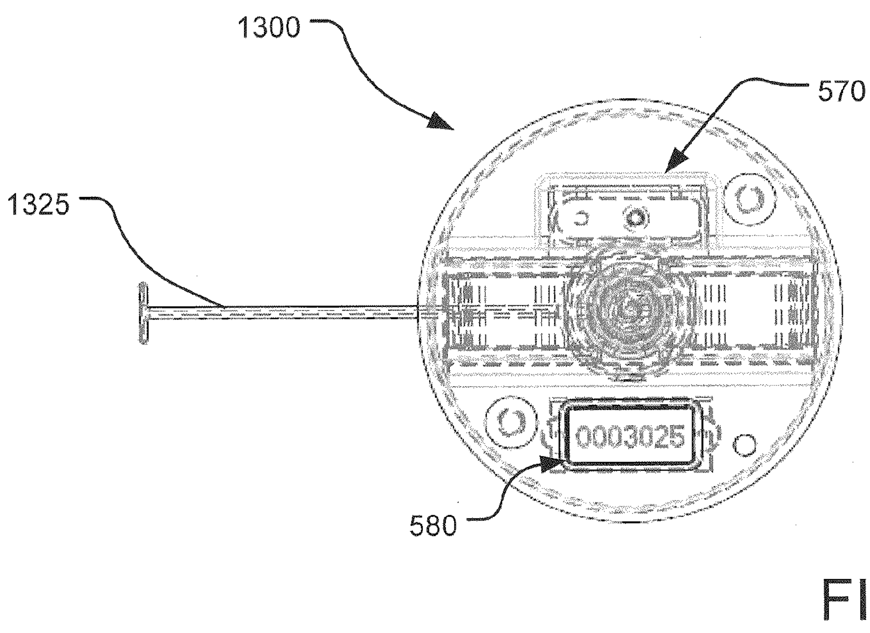

FIG. 19

DISPOSABLE AND TAMPER-RESISTANT RFID LOCK

CROSS-REFERENCE TO RELATED APPLICATIONS

The present application claims benefit of priority under 35 U.S.C. §120 to and is a continuation of U.S. application Ser. No. 14/185,671, filed on Feb. 20, 2014, which is a continuation-in-part of U.S. application Ser. No. 13/625,230, filed on Sep. 24, 2012, now U.S. Pat. No. 8,710,991, which is a continuation-in-part of U.S. application Ser. No. 12/819,902 filed on Jun. 21, 2010, now U.S. Pat. No. 8,274,389, which is a continuation of U.S. application Ser. No. 11/960,128 filed Dec. 19, 2007, now U.S. Pat. No. 7,800,504 which claims benefit of priority under 35 U.S.C. §119(e) to U.S. Application Ser. No. 60/875,726 filed on Dec. 19, 2006. All of the aforementioned patent applications are hereby incorporated by reference in their entirety.

BACKGROUND

Various industries, including, but not limited to, airline and food and drug industries, are increasingly utilizing radio frequency identification ("RFID") technology to identify, track, and locate goods or assets being shipped or transported. However, during shipment or transportation, the goods or assets are vulnerable to harmful activities that threaten their security and integrity. For example, the goods or assets may be vulnerable to tampering, theft, terrorism, or similar activities. To protect against such harmful activities, many industries utilize conventional locks to secure access to the goods or assets. However, without visually examining each of such locks, which is generally time consuming, expensive, and inefficient, it is a challenge to detect whether harmful activities were attempted or have occurred. Furthermore, such visual examination may not indicate whether harmful activities were concealed by merely replacing the lock with another lock that is similar in appearance.

It is with these and other issues in mind that various aspects of the present disclosure were developed.

SUMMARY

Implementations described and claimed herein address the foregoing problems by providing a cost-prohibitive, disposable RFID locking apparatus that secures goods or assets and conveys information regarding the identification and location of the goods or assets and whether the goods or assets have been potentially subjected to harmful activities. In one implementation, the RFID locking apparatus includes an RFID tag, a locking member, and a disabling member. The RFID tag is disposed inside a housing and has a chip and an antenna that emits a signal. The locking member includes a tube that extends outwardly from within the housing. A cable connects to the disabling member and through the tube. The cable is configured to compress a spring into a loaded state. The disabling member is disposed near the spring inside the housing and is configured to damage the antenna and/or the chip, such that the signal cannot be emitted, upon release of the spring from the loaded state. The RFID locking apparatus is configured to release the spring when the locking member is damaged.

Other implementations are also described and recited herein.

BRIEF DESCRIPTION OF THE DRAWINGS

Example implementations are illustrated in referenced figures of the drawings. It is intended that the implementations and figures disclosed herein are to be considered illustrative rather than limiting.

FIG. **1** illustrates a front view of an example RFID locking apparatus.

FIG. **1**A shows the RFID locking apparatus of FIG. **1** with a disabled RFID tag.

FIG. **2** is a perspective view of another example RFID locking apparatus.

FIG. **2**A illustrates the RFID locking apparatus of FIG. **2** with a disabled RFID tag.

FIG. **3** illustrates an exploded side perspective view of another example RFID locking apparatus.

FIG. **3**A shows an exploded bottom perspective of the RFID locking apparatus of FIG. **3**.

FIG. **4** illustrates a top view of an example RFID tag that may be utilized according to the presently disclosed technology.

FIG. **5** illustrates an exploded top perspective view of another example RFID locking apparatus.

FIGS. **6**A and **6**B show top and bottom perspective views, respectively, of an example cover of the RFID locking apparatus of FIG. **5**.

FIGS. **7**A and **7**B are top and bottom perspective views, respectively, of an example foundation of the RFID locking apparatus of FIG. **5**.

FIGS. **8**A and **8**B show top and bottom perspective views, respectively, of an example disabling member of the RFID locking apparatus of FIG. **5**.

FIG. **9** illustrates a side perspective view of the RFID locking apparatus of FIG. **5** in a loaded state with a pin inserted.

FIG. **10** illustrates a side perspective view of the RFID locking apparatus of FIG. **5** in a loaded state without the cover shown.

FIG. **11** illustrates the same view as FIG. **9** with the pin removed and a locking member engaged.

FIG. **12** illustrates a side perspective view of the RFID locking apparatus of FIG. **5** with a destroyed RFID tag and without the cover shown.

FIG. **13** illustrates an exploded top perspective view of another example RFID locking apparatus.

FIG. **14** illustrates a side perspective view of the RFID locking apparatus of FIG. **13** in a loaded state without the cover shown.

FIG. **15** illustrates a side perspective view of the RFID locking apparatus of FIG. **13** in a released state without the cover shown.

FIG. **16** illustrates a side view of the RFID locking apparatus of FIG. **13**.

FIG. **17** illustrates a side perspective view of the internal components of the of the RFID locking apparatus of FIG. **13**.

FIG. **18** illustrates a side perspective view of the example RFID locking apparatus of the RFID locking apparatus of FIG. **13**.

FIG. **19** illustrates a top perspective view of the of the RFID locking apparatus of FIG. **13**.

DETAILED DESCRIPTION

Aspects of the presently disclosed technology involve a cost-prohibitive, disposable RFID locking apparatus that secures one or more goods or assets and conveys information regarding the identification and location of the goods or assets and whether the goods or assets have been potentially subjected to harmful activities. Generally, the RFID locking apparatus includes an RFID tag having a chip and an antenna that emits a signal that may be detected by one or more RFID readers, which may be handheld or stationary. The signal emitted includes an identifying number, which when read by the RFID reader, identifies particular goods or assets associated with that number. With this identification number, the location of the goods or assets may be tracked as they are shipped or transported each time the identification number is detected by RFID readers at various locations. The RFID tag is disposed inside a housing such that the RFID tag cannot be tampered with or otherwise damaged. The identification number may be displayed through a window in the housing to confirm that the RFID tag was not replaced with another RFID tag during shipment or transportation.

To secure the goods or assets, the RFID locking apparatus includes a locking member extending outwardly from within the housing, which may be connected to an apparatus (such as a door, hatch, lid, etc.) that prevents access to the goods or assets. The locking member is configured to compress a spring into a loaded state. When the locking member is connected to the apparatus with the spring in the loaded state, the goods or assets are secure. Each time the signal from the RFID tag is read by one of the RFID readers, the security and integrity of the goods and assets is confirmed.

To detect whether the goods or assets have been potentially subjected to harmful activities, the RFID locking apparatus includes a disabling member disposed near the spring, inside the housing. The disabling member is configured to damage the antenna and/or the chip of the RFID tag such that the signal cannot be emitted. The disabling member may be, for example, a plate, a flange, a blade, or a puncturing member, and the antenna may be damaged, for example, by crushing, crumpling, cutting, or puncturing the RFID tag. The disabling member is configured to damage the antenna and/or the chip upon the release of the spring from the loaded state. The spring is released from the loaded state when the locking member is damaged. For example, the spring is released from the loaded state when the locking member is cut. Because the signal is not emitted after the spring is released from the loaded state, the RFID readers will not detect the identification number associated with the goods or assets, the lack of detection indicating that the goods or assets have been potentially subjected to harmful activities. Various example implementations of the RFID locking apparatus are described below.

One example implementation of the RFID locking apparatus is shown in FIG. **1**. An RFID locking apparatus **10** comprises a housing **100** that contains a flexible RFID tag **110**, a plate **120**, a spring **130**, a portion of a locking stem **140** attached to the plate **120**, and a locking washer **150**. In the example implementation shown in FIG. **1**, the disabling member comprises the plate **120** and the locking member comprises the locking stem **140** and the locking washer **150**.

The housing **100** has openings at a top **160** and a bottom **170** of its structure. The top opening **160** allows a user to thread the RFID tag **110** into a cavity **180** of the housing **100**. The top opening **160** is configured to allow the RFID tag **110** to be threaded into the cavity **180**. In addition, the top opening **160** is sufficiently narrow to prevent other items with greater width than the RFID tag **110** from entering the cavity **180** and to substantially prevent the RFID tag **110** from inadvertently passing back through the top opening **160**. The bottom opening **170** of the housing **100** is configured to allow the locking stem **140** to move freely in and out of the housing **110**. The housing is made of any suitable material, such as plastic, metal or ceramic, that is resistant to moisture and electrical charge and that allows a signal from the RFID tag **110** to be detected.

Pulling the locking stem **140** in a direction away from the bottom opening **170** of the housing **100** causes the plate **120** attached to the locking stem **140** to compress or "load" the spring **130**. In one implementation, the locking stem **140** further comprises a plurality of one way ratchets **141**, which when passed through the locking washer **150**, prevents the locking stem **140** from moving in a reverse direction through the locking washer **150**. As a result of the one way ratchets **141**, when a tail end **142** of the locking stem **140** passes through the locking washer **150**, the only direction the locking stem **140** may move is away from the bottom opening **170** of the housing **100**. Since the plate **120** is attached to the locking stem **140**, it too may only move in one direction once the locking washer **150** has engaged the locking stem **140**. Such direction would be down towards the bottom opening **170** of the housing **100**.

By way of example, the presently disclosed technology may be used to secure or lock a hatch or opening of a trailer containing dry food. The hatch or opening of the trailer may have a first metal ring attached to the trailer and a second metal ring attached to the hatch. The first metal ring aligns with the second metal ring attached to the hatch. To secure the hatch or opening, the tail end **142** of the locking stem **140** is threaded through the second metal ring attached to the hatch. The width or diameter of the housing **100** is adapted to prevent the housing **100** from passing through the second metal ring or the first metal ring. The tail end **142** of the locking stem **140** is threaded through the first metal ring. To lock or secure the hatch to the trailer, the tail end **142** of the locking stem **140** is threaded and pulled through the locking washer **150**. The tail end **142** is pulled until the plate **120** loads the spring **130** sufficiently near the bottom opening **170** of the housing **100**. As described previously, the one way ratchets **141** of the locking stem **140** prevent the locking stem **140** or plate **120** from moving upwards or into the cavity **180** of the housing **100**. The one way ratchets **141** also prevent others from unlocking the RFID locking apparatus **10** from the hatch or opening of the trailer unless they cut the locking stem **140** in the area between the bottom opening **170** of the housing **100** and the locking washer **150**. Once the hatch of the trailer is locked by the RFID locking apparatus **10**, the RFID tag **110** is inserted through the top opening of the housing **160**.

FIG. **1**A shows the RFID locking apparatus **10** of FIG. **1** with the RFID tag **110** disabled. As shown in FIG. **1**A, in one implementation, the disabling member disables the RFID tag **110** when the locking stem **140** is severed. A user would know both visually and through the disablement of the RFID tag **110** that the hatch may have been opened and the goods or assets secured by the RFID locking apparatus **10** may have been subjected to potentially harmful activities. An RFID reader (not pictured) would be unable to detect a signal from the RFID tag **110** because the release of the locking stem **140** from the locking washer **150** results in the spring **130** unloading or decompressing and pushing the plate **120** towards the top opening **160** of the housing **100**, thereby crushing or crumpling the RFID tag **110**. In other words, the plate **120** is of sufficient diameter or width such that when it is pushed by the spring **130** towards the top opening **160** of the housing **100**, it will crush or crumple the RFID tag **110**. Even slightly bending an RFID tag **110**, such as the RFID tag **110**, (to a radius of approximately 25 mm or less) will result in the RFID tag **110** being unable to respond to a signal put out by an RFID reader. As such, once the disabling member, in this implementation the plate **120**, crushes or crumples the RFID tag

110, an antenna and/or a chip of the RFID tag **110** is destroyed such that a signal is no longer emitted that can be received by the RFID reader.

Accordingly, the user would be alerted not only that the RFID tag **110** was not emitting a signal but, in addition, that harmful activities may have occurred by visually observing that the spring **130** was unloaded and that the plate **120** was in a position near the top of the housing **100**.

The presently disclosed technology enables quick identification and location a particular asset or good secured by the RFID locking apparatus **10**. Prior to transporting a good or asset contained in a transportable container, each unique identifying code associated with each RFID tag **110** contained in a housing **100** may be recorded. At every location with an RFID reader system in place, the unique identifying codes associated with the goods or assets are monitored. As such, not only is the identity of the particular good or asset know, but in addition, the location of the good or asset at the time the RFID tag **110** was read is known. As described previously, if the RFID tag **110** was disabled during the course of the transportation of the asset or good, the user would quickly be able to determine the identity of the good or asset that was subjected to potentially harmful activities.

As illustrated in FIG. **2**, another example implementation of the RFID locking apparatus comprises: a housing **200** having a bottom opening **201**; an RFID slot **202** configured to receive and hold a flexible RFID tag **240** in place in the housing **200**; a spring **210**; a portion of a locking stem **220**; a flange **230**; an RFID tag **240**; and a locking washer **250**. The housing **200** may be made of any suitable material, such a plastic, ceramic, or metal, that is resistant to moisture and electrical charge and that allows a signal emitted from the RFID tag **240** to be detected. In the example implementation shown in FIG. **2**, the disabling member comprises the flange **230** and the locking member comprises the locking stem **220** and the locking washer **250**.

FIG. **2** shows the spring **210** in a compressed or loaded state and the flange **230** in a horizontal position (relative to the vertical position of the RFID tag **240**) located underneath the RFID tag **240**. Positioning the flange **230** underneath the RFID tag **240** is accomplished by first pulling the locking stem **220** in a direction that is downward or away from the bottom opening **201** of the housing **200**. In one implementation, the locking stem **220** is connected to the flange **230**. Pulling the locking stem **220** downward forces the flange **230** to move downward towards the bottom opening **201** of the housing **200** and in addition loads or compresses the spring **210**. Prior to pulling the locking stem **200** down, the flange **230** rests against the RFID tag **240** in a vertical position adjacent the top opening **202** of the housing **200**. As the flange **230** is pulled downwards, the pulling force from the locking stem **220** incrementally turns the flange **230** from its vertical position to the horizontal position seen in FIG. **2**. Once the flange **230** turns to its horizontal position, it locks into such horizontal position by way of a locking flange mechanism. While a simple and cost-effective implementation is shown in FIG. **2**, it is contemplated that several mechanisms exist and may be utilized to hold an RFID tag in a housing and load a spring. The embodiment in FIG. **2** is shown by way of example and is not meant to limit the means of holding an RFID tag and loading a spring.

After the flange **230** is positioned underneath the RFID tag **240** and the spring **210** is in a loaded state, the locking washer **250** is used to secure the locking stem **220**. The locking stem **220** is secured by the locking washer **250** through a one-way ratchet design of the locking stem **220**. A plurality of ratchets **221**, **222**, as shown in FIG. **2**A, are located on the locking stem **220**. The ratchets **221**, **222** prevent the locking stem **220** from moving back through the locking washer **250** because of the one way ratchet design. The locking stem **220** may be pulled through the locking washer **250** until the locking washer **250** rests against the bottom of the housing **200**. In this way, the spring **210** remains in a loaded or compressed state unless and until the locking stem **220** is severed or the locking washer **250** removed from the locking stem **220**.

Referring now to FIG. **2**A, the RFID tag **240** is shown in a disabled state. The locking stem **220** has been severed between the locking washer **250** and the bottom opening **201**. With nothing to prevent the spring **210** from returning to its uncompressed state, the locking stem **220** and flange **230** are pushed upwards from the force of the spring **210** uncoiling. Since the flange **230** is locked in its horizontal position underneath the RFID tag **240**, the upward pushing force of the spring **210** crushes or crumples the RFID tag **240**. Once the RFID tag **240** is crushed or crumpled, the RFID tag **240** becomes unreadable or virtually unreadable because of the disruption in the signal emitted from the RFID tag **240**. Specifically, once the RFID tag **240** is crushed or crumpled, an antenna and/or a chip in the RFID tag **240** is destroyed, preventing a signal from being emitted from the RFID tag **240**.

The implementation shown in FIG. **2** and FIG. **2**A is provided by way of example only and is not meant to limit the means for crushing or disabling an RFID tag. For example, as described herein, it is contemplated that an RFID tag may be disabled by way of a cutting means. In such a device, tampering with the RFID locking apparatus would result in a sharp object cutting the RFID tag in a location such that it would be effectively unreadable by an RFID reader. Yet another example contemplated as a means for disabling the RFID tag is a pneumatic force that is activated in response to tampering with the RFID locking apparatus. In lieu of a spring, the activation of a pneumatic force would push a disabling member, such as a plate, flange, or tab, located underneath the RFID tag so that it crushes or crumples the RFID tag. In such a device, a housing may be vacuum sealed with a sealed hose extending from the bottom end of the housing. Cutting the hose would introduce air pressure into the housing thereby forcing the disabling member upwards, thereby crushing the RFID tag.

Referring now to FIG. **3** and FIG. **3**A, another example implementation of the RFID locking apparatus is shown. The RFID locking apparatus **300** comprises: a foundation **310**, a cover **320**; a fastener end container **330**; a blade holder **340**, a blade **350**, a spring **360**, a fastener **370**, and a one-way ratchet fastener lock **380**. In the implementation shown in FIG. **3** and FIG. **3**A, the disabling member comprises the blade **350** and the locking member comprises the fastener **370** and the one-way ratchet fastener lock **380**.

The foundation **310** may be made of any suitable material that is weatherproof and resistant to easy breakage including, but not limited to, metal, plastic or ceramic. For example, in one implementation, the foundation **310** is formed from a hard plastic substance such as polyethylene and has a disc shaped bottom base that is generally flat on its bottom surface. In other implementations, the bottom base of the foundation **310** may be square, rectangular, oval, or any other shape suited for use in a particular industry. In one implementation, the foundation **310** has two raised circular sectors **311**, **312** extending from the top surface of its disc shaped bottom base. In other implementations, the foundation **310** may have two matching rectangular or square cuboids. The circular sectors **311**, **312** are separated by a gap **313**. The gap **313** when covered by a raised semicircular wedge **321** of the cover **320**, forms a passageway that restricts the lateral movement of the fastener end container **330**, the blade holder **340**, and the blade **350** such that the fastener end container **330**, blade holder **340**, and blade **350** may move vertically but not horizontally. In one implementation, the foundation **310** has a fastener hole **314** extending through its disc shaped bottom base and located between its two raised circular sectors **311**, **312** in the area of the gap **313**. The foundation **310** may also have locking holes **315**, **316**, **317** that extend through its disc shaped bottom base.

The shape of the cover **320** is adapted such that it generally matches the shape of the raised surface of the foundation **310**, for example, the raised circular sectors **311**, **312**. In one implementation, the shape of the cover **320** is made so that it tightly encloses the two raised circular sectors **311**, **312** and the top surface of the disc shaped bottom base of the foundation **310**. In other implementations, the cover **320** is shaped such that it tightly encloses any raised structures on the top surface of the foundation **310**. In one implementation, the cover **320** has a disc shaped bottom base and a raised hollow semicircular wedge **321** extending from the top surface of the disc shaped bottom base. As shown in FIG. **3**A, when viewed from the bottom of the cover **320**, the hollow semicircular wedge **321** forms a cavity that accepts the two raised circular sectors **311**, **312** of the foundation **310**. The cover **320** may also have a portal through its disc shaped bottom surface that allows an identifying number as described herein, such as a bar code number, placed on the foundation **310** to be read. The cover **320** may be made of any suitable material that is weatherproof and resistant to easy breakage including but not limited to metal, plastic or ceramic. The material used to fashion the cover **320** and the foundation **310** is made from any suitable material that allows a signal to be detected from an RFID tag. In one implementation, the semicircular wedge **321** of the cover **320** has a dome **323**, which accepts the fastener end container **330**, the blade **350**, and the blade holder **340** in the event that the disabling member disables the RFID tag, as described herein. The cover **320** may have also have locking holes **315**_a_, **316**_a_, **317**_a_ that extend through the surface of its disc shaped bottom base and that match and correspond to the locking holes **315**, **316**, **317** of the foundation **310**.

The spring **360** may be any suitable helical compression spring or similar mechanism. When compressed into a loaded state, the spring **360** will exert a force on a bottom surface of the fastener end container **330** and the blade holder **350**, directly or indirectly. Once the spring **360** is released from the loaded state, the force will drive the blade **350** into the RFID tag, destroying an antenna and/or a chip of the RFID tag, as described in more detail below.

The fastener **370** made of any suitable material such as plastic or metal. In one implementation, a non-fastening end **371** of the fastener **370** is guided through an opening **331** located in the bottom of the fastener end container **330**. The fastener end container **330** may be fashioned in the form of a cup shape having an open top, raised sides and a bottom. However, other shapes are contemplated. The opening **331** in the bottom of the fastener end container **330** is of sufficient dimensions to allow a non-fastening end **371** of the fastener **370** to pass through, as well as the entire length and diameter of the fastener **370**, except for a fastening end **372**. Such a design allows a user to freely pull on the fastener **370** until the fastening end **372** engages the opening **331**. Once this occurs, since the fastening end **372** may not be pulled through the opening **331** of the fastening end container **330**, further pulling of the fastener **370** will force the fastener end container **330** to load or compress the spring **360** placed in the gap **313**.

The spring **360** is placed in the area formed by the gap **313** of the foundation **310**. The non-fastening end **372** of the fastener **370** is guided through a central diameter of the spring **360** and through a fastener hole **314** located in the surface of the foundation **310**. The blade holder **340** and blade **350** may also fit in or be attached to the fastener end holder **330**. The blade holder **340** may be of any suitable shape that fits within or attaches to the open cup space of the fastener end holder **330**. For example, the blade holder **340** may take the shape of a semi-cylindrical wedge with a groove formed to accept the blade **350**. The blade **350** is attached to the blade holder **340** by any suitable means including, but not limited to, gluing or welding. Moreover, the blade holder **340** may be attached to the fastener end container **330** through any suitable means including, but not limited to, gluing or welding.

To set the RFID locking apparatus in a loaded state, the non-fastening end **372** of the fastener **370** is pulled until a tip of the blade **350** is below an area of the gap **313** spanning the highest points of the two raised circular sectors **311**, **312**. In one implementation, the non-fastening end **372** of the fastener **370** is pulled away from the bottom surface of the foundation **310** until the fastener end container **330** can no longer travel in a downward direction away from the dome **323** of the cover **320** and the blade **350** is at its furthest location away from the dome **323**.

An RFID tag, for example RFID tag **400** shown in FIG. **4**, may be utilized in one or more of the implementations shown in FIG. **1** to FIG. **3**A. In one implementation, the RFID tag **400** has an adhesive on one side. As shown in FIG. **3** and FIG. **3**A, the RFID tag **400** may be placed with the adhesive side facing surfaces of the curved arcs of the two raised circular sectors **311**, **312**. Proper placement of the RFID tag **400** will result in a majority of the RFID tag **400** adhering to the surface of the curved arcs of the two raised circular sectors **311**, **312** and a portion of the RFID tag **400**, which is not adhered to the surface of the curved arcs, tautly spanning a top of the gap **313** between the two raised circular sectors **311**, **312**. The cover **320** of the RFID locking apparatus **300** may be placed over the foundation **310** so that the locking holes **315**_a_, **316**_a_, **317**_a_ match the locking holes **315**, **316**, **317** on the foundation **310** and the RFID tag **400** is secured inside the RFID locking apparatus **300**.

In one implementation, the one-way ratchet fastener lock **380** may be placed in locking holes **315**_a_ and **317**_a_. Securing means such as bolts, rivets, or screws may be used to secure the one-way ratchet fastener lock **380**, the cover **320**, and the foundation **310** tightly together. Care must be taken so that a user does not allow the fastener end container **330** holding the blade **350** to move back in a direction towards the dome **323** after the RFID tag **400** is adhered to the surfaces of the curved arcs of the two raised circular sectors **311**, **312**. Releasing the fastener **370** will result in a triggering event that disables the RFID tag **400**. Releasing the non-fastening end **371** of the fastener **370** will cause the spring **360** to unload and thereby thrust the fastening end container **330**, blade **350**, and blade holder **340** in a direction towards the dome **323** of the cover **320**. The blade **350** that is employed is sufficiently sharp and configured so that it will substantially cut an antenna and/or chip portion of the RFID tag **400** that tautly spans the gap **313**. Cutting the RFID tag **400** will result in its disablement so that an RFID tag reader will be unable to discern a signal emitted from the RFID tag **400**.

Taking care that the blade **350** does not cut the RFID tag **400**, in one implementation, the non-fastening end **372** of the fastener **370** is guided through, for example, the metal rings of a door or hatch that secures goods or assets. The fastener **370** is guided through the locking holes **316**, **316**_a_ from the bottom surface of the foundation **310**, through to the top surface of the cover **320**. In another implementation, a one-way ratchet locking washer, such as the one shown and described in FIG. **2**, may be employed directly beneath the bottom surface of the foundation **310** to attach the RFID locking apparatus **300** to the door or hatch securing the goods or assets and to prevent the fastener **370** from moving back in the direction of the RFID locking apparatus **300**. As explained previously, the fastener **370** has ratchets that ensure it will not move in reverse direction once it is pulled through the one-way ratchet fastener lock **380**. The fastener **370** is pulled until there is no slack left in the fastener **370** between the RFID locking apparatus **300**, the door or hatch to be secured, and the fastener lock **380**.

Once the fastener **370** is secured with the fastener lock **380**, if the RFID locking apparatus **300** is tampered with by cutting the area of the fastener **370** between the one-way ratchet fastener lock **380** and the bottom of the foundation **310**, the spring **360** will unload and thrust the blade **350** through the portion of the RFID tag **400** spanning the gap **313** between the two raised circular sectors **311**, **312**. This in turn will disable the RFID tag **400**. Once a truck, for example, passes through an RFID reader gate, it will be quickly and easily known that the RFID locking apparatus **300** has been tampered with and potentially harmful activities may have occurred because a signal will not be detected from the RFID tag **400**.

FIG. **5** illustrates an exploded view of another implementation of the RFID locking apparatus. As shown in FIG. **5**, an RFID locking apparatus **500** includes a foundation **510**, a cover **520**, a disabling member **530**, a spring **540**, a pin **550**, an RFID tag **560**, and a locking member **570**.

In one implementation, the foundation **510** includes one or more extruding sectors, each having a top surface **511**, side surfaces **514**, and a base **517**. The cover **520** is shaped to generally mirror the shape of the foundation **510**. For example, in one implementation, the cover includes a top surface **521**, side surfaces **522**, and a base **523** shaped to generally mirror the top surface **511**, the side surfaces **514**, and the base **517** of the foundation **510**, respectively.

The foundation **510** is adapted to engage the cover **520** to form a housing, which secures the disabling member **530**, the spring **540**, and the RFID tag **560**. For example, the RFID locking apparatus **500** may include one or more screws **590** that may secure the foundation **510** to the cover **520** through locking holes **519** and **528**. As described herein, the RFID tag **560** has a chip and an antenna configured to emit a signal that may be received by an RFID reader. The RFID tag **560** may have, for example, the characteristics of the RFID tag **400**, including an adhesive on one or more sides. However, other characteristics are contemplated.

In one implementation, the top surface **511** includes a channel **512** defined therein. The channel **512** is adapted to receive and place the RFID tag **560** relative to the disabling member **530**, such that the antenna and/or the chip of the RFID tag **560** will be destroyed in response to damage to the locking member **570**. For example, the extruding sectors may form a gap **515** within which the disabling member **530** and the spring **540** move. The RFID tag **560** is placed in the channel **512** of each of the extruding sectors such that at least a portion of the antenna and/or the chip of the RFID tag **560** spans the gap **515**. The channel **512** may include one or more snugs **513** to hold the RFID tag **560** firmly within the channel **512**. The snugs **513** ensure that the antenna and/or the chip of the RFID tag **560** is destroyed by the disabling member **530** rather than being merely displaced as the disabling member **530** contacts the RFID tag **560**.

The RFID tag **560** is associated with an identification number, as described herein. In one implementation, the RFID locking apparatus **500** includes a label display **580** to display a label **581** containing the identification number. The label display **580** includes a window **583** made from a substantially transparent, robust material, including but not limited to plastic or glass, through which the label **581** may be read. The window **583** protects the label **581** from damage caused by environmental factors or from harmful activities. For example, the window **583** prevents someone from removing and replacing the label **581** to conceal that harmful activities have taken place. In one implementation, the foundation **510** includes a surface **518** upon which the label **518** may be placed. The label **518** may include an adhesive on one side to adhere the label **518** to the surface **518**. Alternatively or additionally, the foundation **510** may include one or more securing members to hold the label **518** on the surface **518**. The cover **520** may include a portal **527** placed relative to the surface **518** on the foundation **510** through which the label **518** may be displayed. In one implementation, the label display **580** includes engaging members **582** configured to engage corresponding members on the foundation **510** or the cover **520** to hold the label display **580** in place.

In one implementation, the locking member **570** includes a fastener **571** and a fastener catcher **574**. In one implementation, the fastener catcher **574** is positioned in a holder extruding from the base **517** of the foundation **510**. The fastener **571** is a substantially flexible, robust material, such as plastic or metal. To arm the RFID locking apparatus **500**, a non-fastening end **573** of the fastener **571** is guided through an opening **534** in the disabling member **530**, a central diameter in the spring **540**, and a fastener hole in the foundation **510**. The opening **534** in the disabling member **530** is sized and shaped to permit the length of the fastener **571** to move through the disabling member **530** until a fastening end **572** engages with a surface in the opening **534**. Once the fastening end **572** engages with the opening **534**, the fastener **571** is pulled to compress the spring **540** into a loaded state. In other words, the disabling member **530** is placed relative to the spring **540** such that the force exerted on the disabling member **530** when the fastener **571** is pulled compresses the spring **540** into the loaded state.

In one implementation, the disabling member **530** and the spring **540** are placed in the gap **515**. The gap **515** restricts lateral movement of the disabling member **530** and the spring **540**, such that the disabling member **530** and the spring **540** move vertically within the gap **515** but not horizontally. At least one of the extruding sectors of the foundation **510** may include a track **516** adapted to engage a channel **533** in the disabling member **530** to restrict movement of the disabling member **530** to the length of the track **516**. Further, the disabling member **530** may include one or more legs **535** that extrude from a body **525** of the disabling member **530** and cover a portion of the spring **540** when the disabling member **530** is placed relative to the spring **540**. The legs **535** and the track **516** ensure that a puncturing member **531** remains firmly aimed at the RFID tag **560** during movement.

Once the spring **540** is compressed into the loaded state, the RFID tag **560** is placed on the channel **512** such that the antenna and/or the chip of the RFID tag **560** spans the gap **515** and the disabling member **530** is positioned relative to the antenna and/or the chip of the RFID tag **560**. Specifically, the disabling member **530** is positioned to destroy the antenna and/or the chip, such that a signal cannot be emitted, upon release of the spring **540** from the loaded state in response to a portion of a locking member **570** being damaged.

In one implementation, after the RFID tag **560** is placed, the cover **520** is placed to engage the foundation **510**. An inserting end **551** of the pin **550** may be guided through an arming hole **525** in the cover **520** to hold the spring **540** in the loaded state. The cover **520** may include an indicator **526** that identifies whether the RFID locking apparatus **500** is armed with the spring **540** in the loaded state. For example, the indicator **526** may display a color or other visual cue indicating that the RFID locking apparatus **500** is armed. In one implementation, the indicator **526** is an opening in the cover **520** through which a color or other visual cue may be displayed. The RFID locking apparatus **500** may be armed during manufacturing, assembly, or on-site during use. Arming the RFID locking apparatus **500** during assembly allows for more efficient and error proof installation.

During installation, the non-fastening end **573** of the fastener **571** is guided through a portion of an object securing an opening to the goods or assets to engage the locking member **570**. For example, the goods or assets may be secured by a door or hatch having rings, as described herein. The non-fastening end **573** is guided through a central diameter of the ring and through a hole **575** in the fastener catcher **574**. The fastener catcher **574** locks the fastener **571** in place, preventing the fastener **571** from moving in a reverse direction back through the fastener hole in the foundation **510**. The fastener **571** is pulled until there is no slack left in the fastener **571** between the fastener hole in the foundation **510** and the fastener catcher **574**. Once the locking member **570** is engaged, the pin **550** is removed, installing the RFID locking apparatus **500** for use. In some implementations, the RFID locking apparatus **500** may include a seal that is configured to break when the pin **550** is removed to confirm that the RFID locking apparatus **500** was not tampered with prior to installation.

Once the RFID locking apparatus **500** is installed, if the RFID locking apparatus **500** is tampered with by damaging a portion of the locking member **570**, for example by severing part of the exposed area of the fastener **571**, the spring **540** is released from the loaded state causing the disabling member **530** to destroy the antenna and/or the chip of the RFID tag **560**, such that a signal cannot be emitted. In one implementation, releasing the spring **540** from the loaded state thrusts the disabling member **530** towards the RFID tag **560** causing the puncturing member **531** to puncture or otherwise sever a portion of the RFID tag **560**, thereby destroying the antenna and/or the chip of the RFID tag **560**.

In one implementation, the cover **520** includes a dome **524** which accepts the disabling member **530** once the spring **540** is released. The dome **524** may include one or more ribs to prevent the puncturing member **571** from damaging the cover **520**. After use, the RFID tag **560** and the label **581** may be disposed and the remaining components of the RFID locking apparatus **500** may be recycled or reused.

FIGS. **6**A and **6**B show top and bottom perspective views, respectively, of the cover **520**. The cover **520** may be made from a substantially robust, weatherproof material, including but not limited to metal, plastic, or ceramic, that permits the signal emitted from the RFID tag **560** to be detected by an RFID reader.

As detailed with respect to FIG. **5**, the shape and size of the cover **520** is mirrored to match the size and shape of the foundation **510**. In one implementation, the base **523** has a disk shape, the top surface **521** is generally curved, the dome **524** is generally cylindrical, and the side surfaces **524** are generally flat. The top surface **521** and the side surfaces **524** form a semicircular wedge extruding from the base **523**. In other implementations, the top surface **521** and/or the side surfaces **524** may have surface(s) that are contoured, planar, flat, angled, or some combination of them. The dome **524** may be generally spherical, rectangular, conical, elliptical, or pyramidal. However, other shapes are contemplated. In one implementation, the cover **520** is approximately 2.5 to 3.0 inches as measured from the base **523** to a highest point on the dome **524** and approximately 2.0 to 2.5 inches as measured from the base **523** to a lowest point (e.g., at one of the ribs) on the dome **524**. In one particular implementation, the cover **520** is approximately 2.640 inches as measured from the base **523** to a highest point on the dome **524** and approximately 2.125 inches as measured from the base **523** to a lowest point (e.g., at one of the ribs) on the dome **524**.

In one implementation, the cover **520** includes a first cavity **600** adapted to receive the extruding sectors of the foundation **510** and a fastener catcher housing **604** having a second cavity **602** adapted to receive the fastener catcher **574**. In another implementation, a single cavity in the cover **520** may be adapted to receive both the extruding sectors of the foundation **510** and the fastener catcher **574**.

As detailed with respect to FIG. **5**, the cover **520** may include engaging members **606** in the base **523** configured to engage the engaging members **582** of the label display **580** to hold the label display **580** in place.

As shown in FIGS. **7**A and **7**B, which are top and bottom perspective views, respectively, of the foundation **510**, in one implementation, the base **517** includes an extruded member **700** adapted to position the spring **540** over a first fastening hole **702** in the base **517**. As described with respect to FIG. **5**, during arming and installation the non-fastening end **573** of the fastener **571** is guided through the first fastening hole **702** and a second fastening hole **704** in the base **517**, which is positioned relative to the hole **575** in the fastener catcher **574**.

The foundation **510** may be made from a substantially robust, material, including but not limited to metal, plastic, or ceramic. In one implementation, the top surface **511** is curved. In other implementations, the top surface **511** comprises one or more surfaces that are contoured, planar, flat, angled, or some other combination. In one implementation, the base **517** has a disk shape and the side surfaces **514** are generally flat. In other implementations, the base **517** and/or the side surfaces **524** may have surface(s) that are contoured, planar, flat, angled, or some combination of them. In one implementation, the foundation **510** is approximately 2.0 to 2.5 inches as measured from the base **517** to a highest point on the extruding sectors. In one particular implementation, the foundation **510** is approximately 2.220 inches as measured from the base **517** to a highest point on the extruding sectors. The dimensions of the foundation **510** are configured to maximize the thrust force created when the spring **540** is released from the loaded state while minimizing the overall volume of the RFID locking apparatus **500**.

FIGS. **8**A and **8**B illustrate top and bottom perspective views, respectively, of the disabling member **530**. In one implementation, the base **532** is substantially cylindrical in shape. In other implementations, the base **532** is generally spherical, rectangular, conical, elliptical, or pyramidal. In one implementation, the opening **534** and the legs **535** are generally rectangular in shape, and the channel **533** is contoured. However, other shapes are contemplated. The disabling member **530** is made from a substantially robust material, including, but not limited to, plastic, metal, ceramic, or glass.

As described with respect to FIG. **5**, the base **532** includes an opening **534** defined therein. The opening **534** is sized and shaped to permit the length of the fastener **571** to move through a hole **800** until the fastening end **572** engages with a surface **802** in the opening **534**. In one implementation, a fastening member **804** extrudes from the surface **802** to form the hole **800**. Once the fastening end **572** engages with the opening **534**, the fastener **571** is pulled to compress the spring **540** into the loaded state. In other words, the disabling member **530** is placed relative to the spring **540** such that the force exerted on the disabling member **530** when the fastener **571** is pulled exerts a force on the spring **540** from the surface **802** to compress the spring **540** into the loaded state. Similarly, once the spring **540** is released from the loaded state, the force exerted on the surface **802** by the spring **540** thrusts the puncturing member **531** into a portion of the RFID tag **560**.

The puncturing member **531** is shaped to easily puncture, sever, or otherwise destroy the antenna and/or the chip of the RFID tag **560**. In one implementation, the puncturing member **531** has a generally rectangular shape with a pointed, triangular tip. The puncturing member **531** may have a plurality of angled surfaces. In one implementation, the puncturing member **531** is approximately 0.25 to 0.3 inches wide, and the base **532** is approximately 0.625 to 0.675 inches tall. In a particular implementation, the puncturing member **531** is approximately 0.270 inches wide, and the base **532** is approximately 0.640 inches tall.

FIGS. **9** and **10** illustrate side perspective views of the RFID locking apparatus **500** in the loaded state with the pin **550** inserted, with and without the cover **520** shown, respectively. As described with respect to FIG. **5**, the pin **550** is positioned in the arming hole **525** in the cover **520** to hold the spring **540** in the loaded state. In one implementation, the pin **550** is positioned over the base **532** of the disabling member **530** holding the spring **540** in the loaded state. In other words, the position of the pin **550** prevents the force exerted on the base **532** of the disabling member **530** by the spring **540** from moving the disabling member **530** towards the RFID tag **560**.

As shown in FIG. **9**, in one implementation, the fastener catcher housing **604** includes a securing hole **900** through which the non-fastening end **573** of the fastener **571** may be guided to install the RFID locking apparatus **500**. FIG. **11** illustrates the same view as FIG. **9** with the pin **550** removed and the locking member **570** engaged. As described with respect to FIG. **5**, during installation, the non-fastening end **573** of the fastener **571** is guided through a portion of an object securing an opening to the goods or assets and through a hole **575** in the fastener catcher **574** to engage the locking member **570**. In one implementation, the hole **575** in the fastener catcher **574** is positioned relative to the securing hole **900** in the fastener catcher housing **604**. The fastener catcher **574** locks the fastener **571** in place, preventing the fastener **571** from moving in a reverse direction back through the fastener hole in the foundation **510**. As shown in FIG. **11**, the fastener **571** is pulled through the securing hole **900** until there is no slack left in the fastener **571** between the first fastener hole **702** and the second fastening hole **704** in the base **517** of the foundation **510**. Once the locking member **570** is engaged, the pin **550** is removed, as shown in FIG. **11**, installing the RFID locking apparatus **500** for use.

FIG. **12** illustrates a side perspective view of the RFID locking apparatus **500** with the RFID tag **560** destroyed and without the cover **520** shown for clarity. As described with respect to FIG. **5**, once the RFID locking apparatus **500** is installed, if the RFID locking apparatus **500** is tampered with by damaging a portion of the locking member **570**, for example by severing part of the exposed area of the fastener **571**, as shown in FIG. **12**, the spring **540** is released from the loaded state causing the disabling member **530** to destroy the antenna and/or the chip of the RFID tag **560**, such that a signal cannot be emitted. In one implementation, releasing the spring **540** from the loaded state thrusts the disabling member **530** towards the RFID tag **560** causing the puncturing member **531** to puncture or otherwise sever a portion of the RFID tag **560**, thereby destroying the antenna and/or the chip of the RFID tag **560**, as shown in FIG. **12**.

FIG. **13** illustrates an exploded view of another implementation of the RFID locking apparatus. As shown in FIG. **13**, an RFID locking apparatus **1300** includes many of the same features and components as the RFID locking apparatus **500**. For example, the RFID locking apparatus **1300** includes a foundation **510**, a cover **520**, a spring **540**, an RFID tag **560**, and a locking member **570**. The RFID locking apparatus **1300** also includes a modified disabling member **1330** and a modified locking member that includes a ridged tube **1310**, a retainer **1320** with a retainer handle **1325**, and a cable **1340**.

In one implementation, the disabling member **1330** and the spring **540** are placed in the gap **515**. The gap **515** restricts lateral movement of the disabling member **1330** and the spring **540**, such that the disabling member **1330** and the spring **540** move vertically within the gap **515** but not horizontally. At least one of the extruding sectors of the foundation **510** may include a track **516** adapted to engage a channel **1333** in the disabling member **1330** to restrict movement of the disabling member **1330** to the length of the track **516**. Further, the disabling member **1330** may include one or more legs **1335** that extrude from a body **1332** of the disabling member **1330** and cover a portion of the spring **540** when the disabling member **1330** is placed relative to the spring **540**. The legs **1335** and the track **516** ensure that a puncturing member **1331** remains firmly aimed at the RFID tag **560** during movement. The disabling member **1330** also includes a cavity **1334** and channel **1336** shaped to receive and securely fasten an insert end **1341** of the cable **1340**. In this implementation, the cavity **1334** is generally cylindrical in shape and has a channel **1336** for receiving the insert end **1341** and for allowing for the cable **1340** to exit from the bottom of the disabling member **1330**. The cable **1340** may be flexible or rigid and may be made from a variety of materials, including, without limitation, metal, plastic, ceramic, fabric, wood, and/or the like.

As with the RFID locking apparatus **500**, the disabling member **1330** is positioned to destroy the antenna and/or the chip, such that a signal cannot be emitted, upon release of the spring **540**. To arm the RFID locking apparatus **1300**, the RFID locking apparatus **1300** utilizes the spring **540** along with the ridged tube **1310**, the retainer **1320**, the disabling member **1330**, and the cable **1340** of the locking member.

In one implementation, to arm the RFID locking apparatus **1300**, the cable **1340** is pulled down through the ridged tube **1310**, thereby compressing the spring **540**. The retainer **1320** is then engaged around the ridged tube. Stated differently, sliding the retainer **1320** along the ridged tube **1310** compresses the ridged tube and holds the cable **1340** in place. The RFID locking apparatus **1300** is armed and the cable **1340** is attached to a shipping container using the outer end **1342**. If the cable **1340** or the retainer **1320** is tampered with, the spring **540** is released and the disabling member disables the RFID tag **560**. A fastener **570** may also be used as a secondary locking mechanism for added security and/or configured to prevent the accidental disabling of the RFID tag **560**.

The RFID tag **560** may then be placed and the cover **520** the cover **520** is positioned to engage the foundation **510**. The cover **520** may include an indicator **526** that identifies whether the RFID locking apparatus **500** is armed with the spring **540** in the loaded state. For example, the indicator **526** may display a color or other visual cue indicating that the RFID locking apparatus **1300** is armed. In one implementation, the indicator **526** is an opening in the cover **520** through which a color or other visual cue may be displayed. The RFID locking apparatus **1300** may be armed during manufacturing, assembly, or on-site during use.

FIGS. **14** and **15** illustrate a side perspective view of the RFID locking apparatus of FIG. **13** in loaded and released states, respectively. The ridges of the ridged tube **1310** are relatively uniform in spacing and shape. The ridges extend outwards linearly, starting at a first outside diameter of the ridged tube **1310** and extending to a second greater outside diameter. Once the second outside diameter is reached, the diameter extends directly back to the first outside diameter, forming a series of ridges. The retainer **1320** includes angled sides **1321**, **1322** and stops **1323**, **1324** for engaging the ridged tube **1310**. The combination of the angled sides **1321**, **1322**, the stops **1323**, **1324**, and the ridges **1311**, **1312** allow the retainer to move up the ridged tube **1310** towards the base **517**, but does not allow the retainer **1320** to slide back down the ridged tube **1310**. Thus, the retainer **1320** cannot be removed without damaging either the ridged tube **1310** or the retainer **1320**. In some implementations, the ridged tube **1310** and/or the retainer **1320** may be constructed using a flexible or semi-flexible material such as plastic or metal that allows for the retainer **1320** to flex as the retainer **1320** is cinched down as the retainer moves up the ridged tube **1310**.

FIG. **16** illustrates a side view of the RFID locking apparatus of FIG. **13** with the cover installed. In this example, the RFID locking apparatus **1300** was armed by engaging the retainer **1320** on the ridged tube **1310** and subsequently triggered, resulting in the RFID tag **560** being disabled. FIG. **17** provides a side perspective view of the internal components of the of the RFID locking apparatus of FIG. **13**. In this example, the disabling member **1330** is shown with the insert end **1341** of the cable **1340** attached and the disabling member **1330** puncturing the RFID tag **560**. When the RFID locking apparatus **1300** was triggered the outer end **1342** of the cable **1340** is no longer held outside the ridged tube **1310**, allowing for the compressed spring **540** to unload, causing the disabling member **1330** to disable the RFID tag **560**.

FIG. **18** illustrates a side perspective view of the example RFID locking apparatus of the RFID locking apparatus of FIG. **13**. In this example, the cover **520** has been installed and the RFID locking apparatus **1300** has been triggered. The retainer handle **1325** is also shown attached to the retainer **1320**. FIG. **19** illustrates a top perspective view of the of the RFID locking apparatus of FIG. **13**. The placement of the locking member **570** and label display **580** are also depicted from this perspective.

All directional references (e.g., proximal, distal, upper, lower, upward, downward, left, right, lateral, front, back, top, bottom, above, below, vertical, horizontal, clockwise, and counterclockwise) are only used for identification purposes to aid the reader's understanding of the presently disclosed technology, and do not create limitations, particularly as to the position, orientation, or use of the presently disclosed technology. Connection references (e.g., attached, coupled, connected, and joined) are to be construed broadly and may include intermediate members between a collection of elements and relative movement between elements unless otherwise indicated. As such, connection references do not necessarily infer that two elements are directly connected and in fixed relation to each other. The exemplary drawings are for purposes of illustration only and the dimensions, positions, order and relative sizes reflected in the drawings attached hereto may vary.

The above specification, examples, and data provide a complete description of the structure and use of example implementations of the presently disclosed technology. Since many implementations of the presently disclosed technology can be made without departing from the spirit and scope of the presently disclosed technology, the scope resides in the claims hereinafter appended. Furthermore, structural features of the different implementations may be combined in yet another implementation without departing from the recited claims. The scope of the presently disclosed technology is intended to embrace all such alternatives, modifications, and variations together with all equivalents thereof. The implementations described above and other implementations are within the scope of the following claims.

What is claimed is:

1. A method for arming an RFID locking apparatus, the method comprising:

placing an RFID tag having a chip and an antenna configured to emit a signal within a housing;

compressing a spring into a loaded state, positioning a disabling member to destroy one or more of the antenna and the chip, such that the signal cannot be emitted, upon release of the spring from the loaded state in response to at least a portion of a retainer being damaged; and

securing the retainer to a cable exiting the housing and connected to the disabling member, the retainer and the cable holding the spring in the loaded state.

2. The method of claim **1**, further comprising:

engaging the cable to a shipping container.

3. The method of claim **1**, wherein securing the retainer comprises sliding the retainer over a tube extending from the housing.

4. A method for arming an RFID locking apparatus, the method comprising:

releasing a spring from a loaded state in response to a portion of a locking member being damaged, wherein the locking member includes a cable and a retainer, the cable holding the spring in the loaded state and the retainer holding the cable in place, wherein the retainer releases the cable in response to the portion of the locking member being damaged; and

destroying one or more of an antenna and a chip of an RFID tag, such that the RFID tag cannot emit a signal, upon release of the spring from the loaded state.

5. The method of claim **4**, wherein the locking member further comprises a tube extending from inside a housing to outside the housing, the tube in substantial alignment with the spring, wherein the cable passes through the tube and a middle of the spring to connect the disabling member and the retainer is configured to engage the tube and lock the cable.

6. The method of claim **5**, wherein the tube comprises outside ridges and the retainer comprises angled sides with stops configured to allow the retainer to move along the tube towards the housing and to prevent the retainer from moving away from the housing.

7. The method of claim **6**, wherein the cable comprises an insert end and the disabling member comprises a cavity shaped to accept the insert end and a channel configured to allow the passage of the insert end to the cavity and to allow the cable to exit the cavity.

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